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WIRED

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*by Chris Anderson*

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nothing is sacred | mar. 2008

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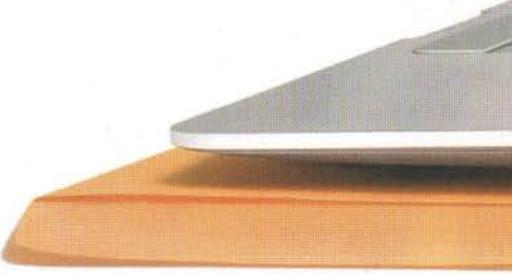


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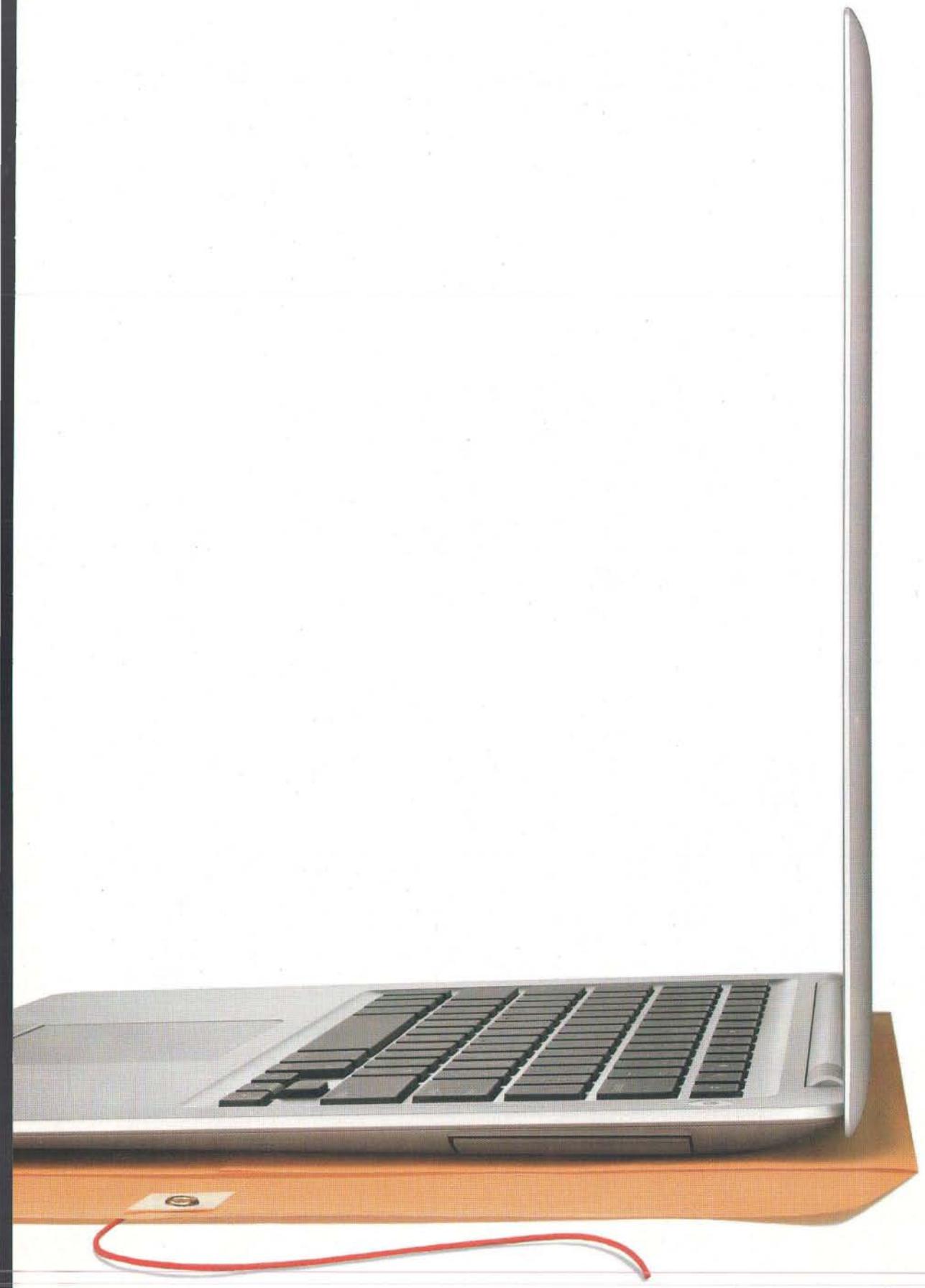


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Smitten dog

With all the howling Max was doing, my husband Eric and



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ON DISCERNING TASTE

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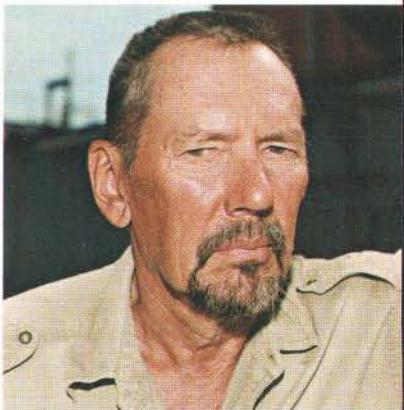
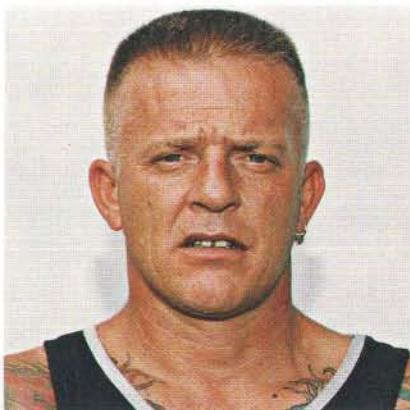
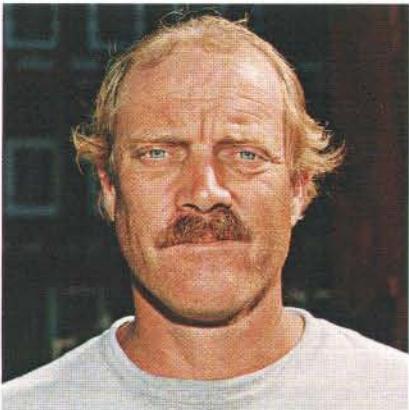
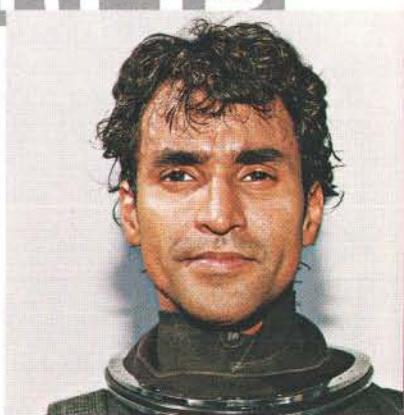
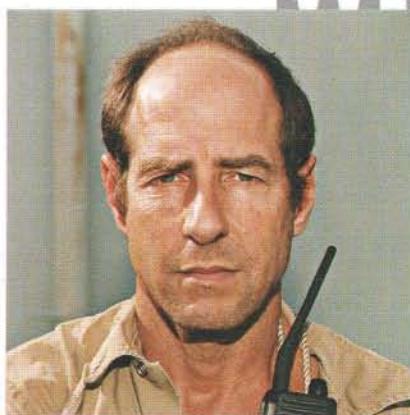
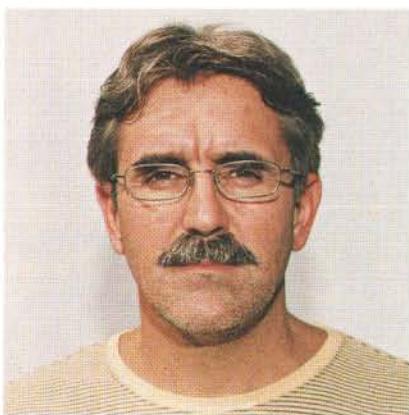
The judges give it a perfect 10.

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## The Sea Cowboys

When a freighter packed with 5,000 Mazdas worth \$103 million flips onto its side in the North Pacific, a team of high tech rescue artists gets the call. Inside the epic struggle to save the *Cougar Ace*.

BY JOSHUA DAVIS

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From census reports to online video to blog posts, a new crop of artists are translating data and information into fantastic abstractions.

BY TIM MCKEOUGH



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\*As shown: 2008 Lincoln MKZ with optional equipment.  
MSRP \$31,685. Destination, tax, title and license fees extra.

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Not once.

Not ever.

*My dream is to do extraordinary things every day.*

Life's calling. Where to next?

### *Power On*

My parents always treated me like any other kid. And when I fell, my mom didn't always rush to pick me up. "Sarah's going to pick herself up." It was a really important lesson for me to learn. For me to keep up, I always had to be tougher than the rest. And I think that's still true today.

*— Sarah Reinertsen*



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DO YOU WANT TO BE A FROG HUNTER?

DO YOU WANT TO BE A FROG HUNTER?

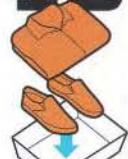
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PRICELESS IN LIFE?



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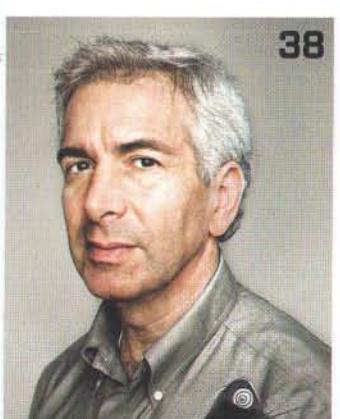
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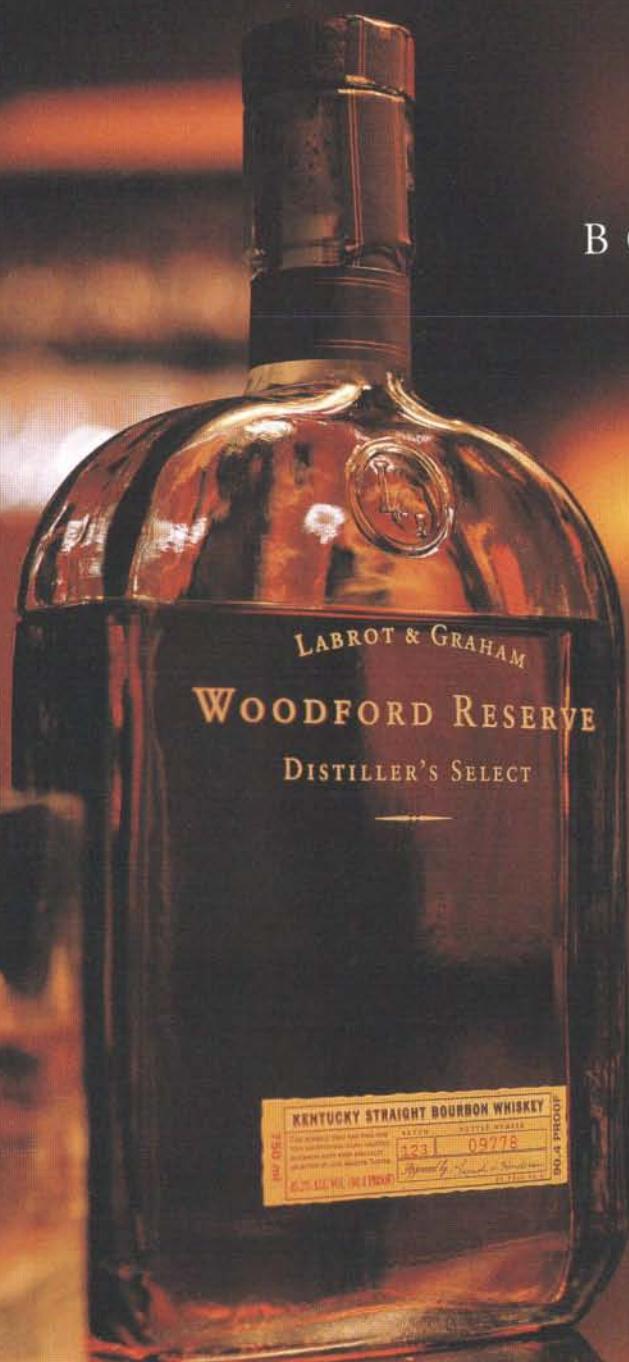
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## Departments | 16.03

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### The Nukes of October

Documents and photos offer additional proof of the plan hatched by Richard Nixon and Henry Kissinger to end the conflict in Vietnam by pretending to launch a nuclear strike on the USSR.



### S.O.S

Schematics, Coast Guard video, and journal entries chronicle the attempt by Titan Salvage to recover the foundered freighter *Cougar Ace*.



### Walking the Walk

We know, we know: A newsstand copy of WIRED will set you back \$4.99, which is nowhere close to free (although we think it's great value). In the spirit of our cover story, we'll send a gratis copy of this month's issue to the first 10,000 people who ask. See [wired.com/free](http://wired.com/free) for details.



### The Blog Network

Keep pace with technology, culture, business, and more at [blog.wired.com](http://blog.wired.com).

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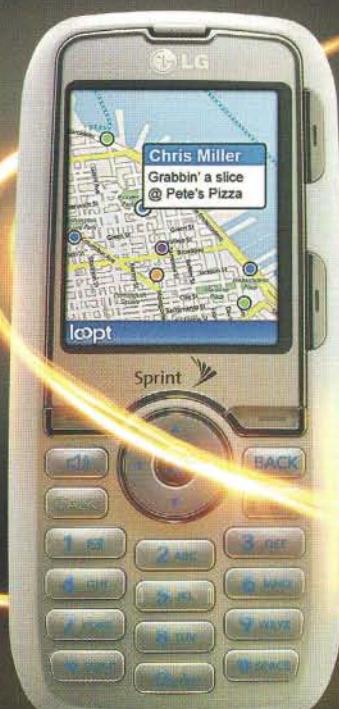
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Sprint  ahead

# The technical, well-engineered science of getting you off your duff.

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Thanks to a new innovation—a social networking application for your Sprint phone—you can now socialize the modern way: on the go. You get all the networking standards: pictures, profiles and “poking.” But now you can take them out of the virtual world to places like restaurants and theaters and museums. You know, where real people are.



Social networking was invented in 776, via the messenger pigeon. 1,300 years later we've enhanced the concept.

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Seeing someone's future: still impossible. Seeing someone's location: true science.

And like the best technological advancements, you can use it right now. Visit [sprint.loopt.com](http://sprint.loopt.com) and register your information.\* You will be prompted through a few easy-to-follow steps. Then you're all set. But make sure three or four of your favorite people do it as well, or the whole thing is pointless.

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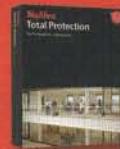
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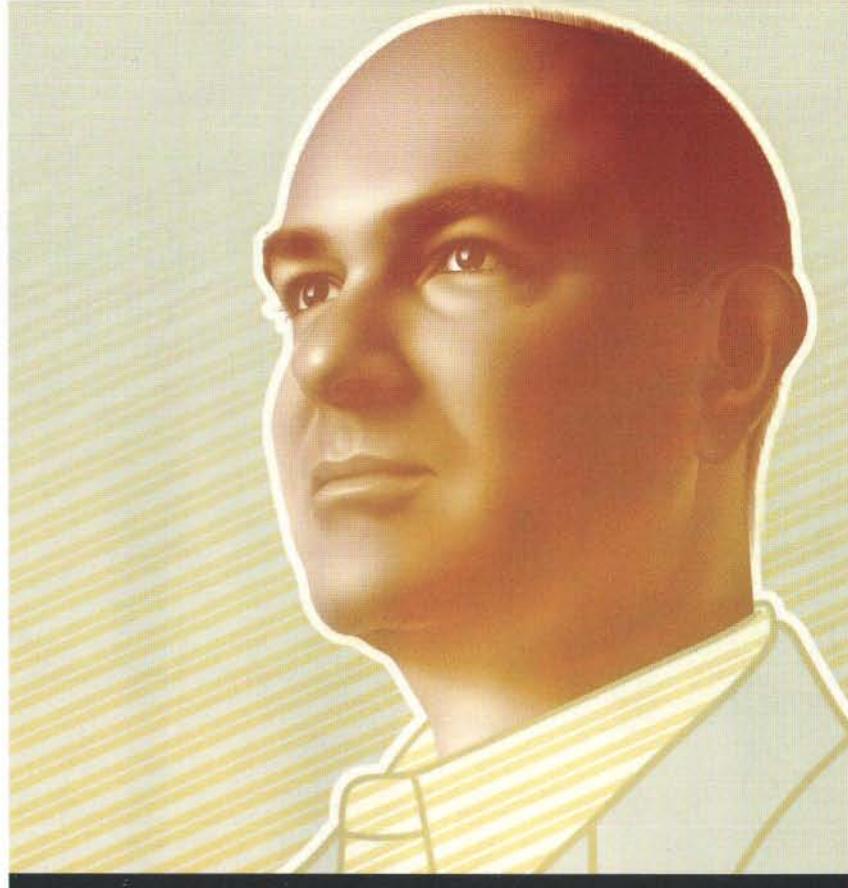
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## Contributors | 16.03

You want something, you have to pay for it. Right? Not anymore. As WIRED editor in chief **Chris Anderson** writes on page 140, the falling costs of bandwidth, processing, and storage are driving the prices of Web-based offerings to zero. Plus, there's a boom in so-called cross-subsidies: charging Peter to give something to Paul. "There is such a thing as a free lunch," says Anderson, author of *The Long Tail*, "as long as someone else is picking up the tab."



**Joshua Davis**

A contributing editor for WIRED, Davis has written 20 features for the magazine, and they've taken him from the coca fields of Colombia to the front-lines of Iraq. For his piece on the astonishing rescue of a capsized freighter (page 172), Davis flew to the Caribbean to meet with the salvage team. Of its cool-headed project leader, Rich Habib, Davis says: "Unless a sinking oil tanker were going up in flames, he probably wouldn't get too concerned."



**Jessica Dimmock**

Amanda Baggs has a form of autism so severe that verbal communication is impossible. But with a keyboard and her voice-simulation software, she'll chew your ear off at 120 words a minute. "She can't speak, but she's amazingly articulate," says Dimmock, who photographed Baggs for our story on the changing perceptions of autism—both among autistics themselves and in the medical community and the world at large (page 154).



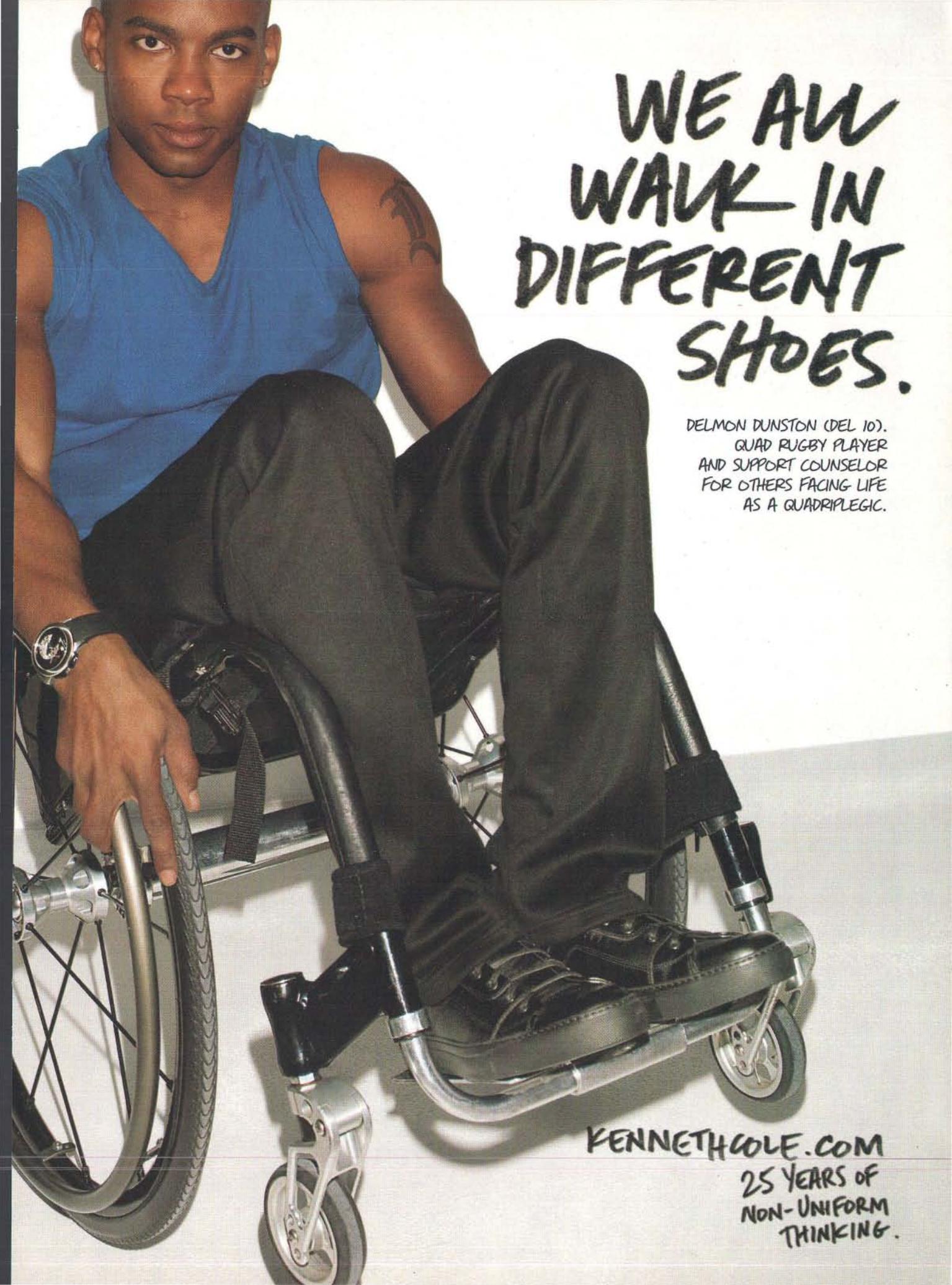
**Steve Bodow**

"As a TV writer, I was on strike during the start of the presidential primaries," says Bodow, head writer for *The Daily Show With Jon Stewart*. "So I fantasized about a race I could actually cover." That's how he conceived the election of 2024, in which an Asian billionaire Republican squares off against a Democratic governor of Texas (page 150). The winner inherits a West Wing recovering from the disastrous Gore administration. *Kristen Gore*, that is.



**Neville Brody**

When WIRED asked acclaimed graphic artist Brody to produce the opening art for this month's feature section (page 139), he says he was "experimenting with mixing color swatches and light." So the "Rainbow Portrait" of Queen Elizabeth I made a logical starting point. The volume and number of the issue, rendered in a typeface Brody recently created called Peace Now, have an additional connection to the queen, who died in...oops! Almost gave it away.



WE ALL  
WALK IN  
DIFFERENT  
SHOES.

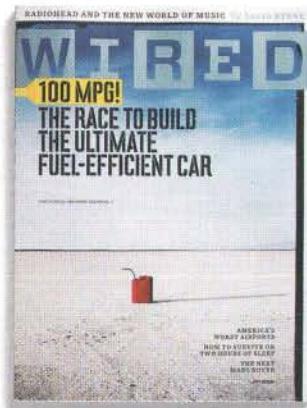
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# RE: Coded Messages

AS ANY PROGRAMMER WORTH HIS SALTY SNACKS will tell you, one of the best parts of writing code is slipping in Easter eggs—little jokes or funny subroutines to surprise and delight users down the line. Same goes for making magazines. For example, in January's article about immersive gaming, we concealed the large-type pull quotes in the main text of the piece. And to illustrate a story on iTunes imposters, we ran pixelated pop icons that some of you took the time to ID. (Confidential to Matt in Arizona: The red-shirted quartet is Kraftwerk.) Ever think we might be getting a little frisky with the design of our page numbers? Of course we are! There may even be some shenanigans in this very issue. In fact, any time you notice us doing something sneaky, call us out. As any programmer will tell you, it's no fun writing Easter eggs if no one ever finds them.

EDITORIAL CORRESPONDENCE [rants@wired.com](mailto:rants@wired.com)

## Plane Ugly

I'm excited by the automotive X-Prize ("The Race to Build the 100-MPG Car," issue 16.01). However, my concern with the new Typ-1 Aptera is that it lacks style and will only appeal to weekend Cessna pilots, not the masses. As a consumer, I don't feel anything for tricycles draped with landing gear wheel covers; there will have to be a compromise between two camps—automotive design (emotive aesthetics) and automotive function (aerodynamics and gas mileage)—to create a more appealing vehicle. Good design means having both beauty and practicality.

**Todd J. Elliott**  
MANSFIELD, MASSACHUSETTS

## Lame Game

When I realized that the article about Trent Reznor ("And Now a Game From Our Sponsors," issue 16.01) contained a code, I quickly started solving the puzzle. I soon realized that I had simply been duped. WIRED's Orphan Annie decoder ring was nothing more than two pull quotes!

**Scott Trudeau**  
CORPUS CHRISTI, TEXAS

Vehicles that get 100 mpg are already here, and have been for at least 50 years. They're called scooters.

**Rob Thorn**  
COLUMBUS, OHIO

## Rainbow Bright

Having David Byrne interview Thom Yorke of Radiohead was brilliant ("The Radiohead Revolution," issue 16.01). The fact that Radiohead released its latest album, *In Rainbows*, without DRM, let people pay what they liked (which was often nothing), yet still were able to make more money than on any of their previous artistic endeavors should send shock waves through the industry.

**Aaron Anderer**  
PLEASANTON, CALIFORNIA

## Stop Making Sense

David Byrne is a genius, and much too cool to complain about music piracy. ("The Fall and Rise of Music," issue 16.01). But there's a hole in his argument. People like Byrne and Bob Dylan can get by on TV licensing and ads for Victoria's Secret. But how about the other 99 percent of musicians? Byrne tells them that owning the publishing rights to their music "is their pension plan." If so, artists better get used to eating cat food.

**Martin Percy**  
LONDON, ENGLAND

## Unplugged

I enjoyed Daniel McGinn's piece on constructing upgradable houses ("Home Sweet Gadget," Start, issue 16.01), but I take issue with his statement that "electricity will always need wires." A few months ago, this very magazine ran an item on WiTricity, the MIT project using magnetic resonance for wireless electricity transfer. While they're at it, pipeless plumbing certainly would be nice, too.

**Jonathan Salkind**  
DREXEL HILL, PENNSYLVANIA



## Color Commentary

I was surprised to read about a new DNA test that can identify a person's "race" and thereby assist law enforcement with investigations ("Criminal Code," Posts, issue 16.01). I had my DNA analyzed and learned that markers on my Y chromosome place me within the same haplogroup as many African Americans. I'm blond (well, now gray) and blue-eyed.

At the level of DNA, race is an invalid concept.

**Timothy V. Chavis**  
RADFORD, VIRGINIA

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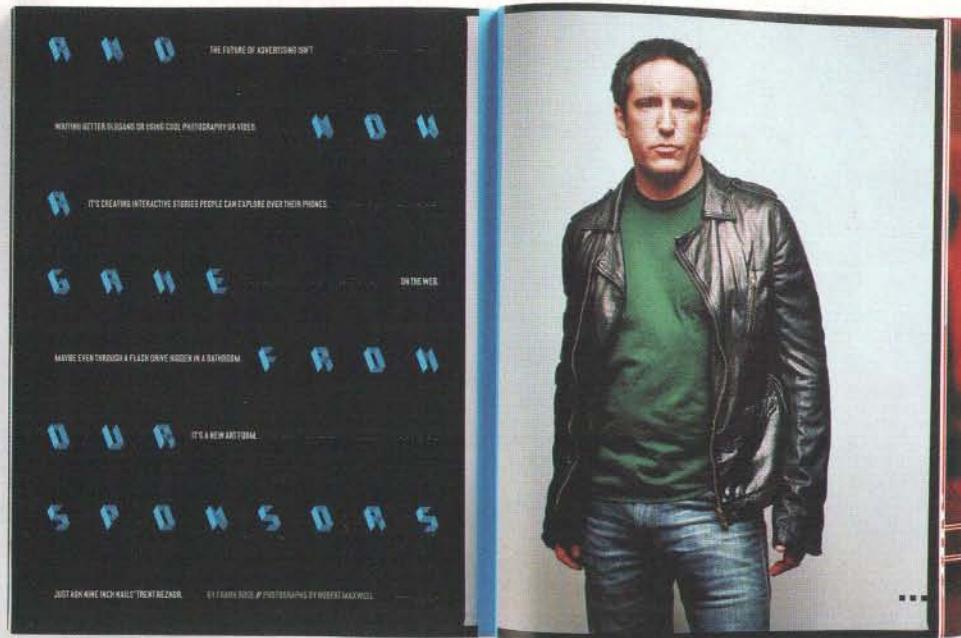
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Am I the only one who thinks that this game is a bit sadistic and those who followed it are mindless lemmings?

*Excerpted from comment posted on [Wired.com](http://Wired.com) by Cramco*



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## We Come in Peace

We're sending a nuclear-powered, percussive drill-wielding, neutron gun-firing, laser-vaporizing robot to the Red Planet ("Mars Rover, All New for 2009," Start, issue 16.01). And we thought the Martians would bring their ray-guns first!

**Andy Brunker**  
MARION, IOWA

## Return to Sender

*See page 194 for contest rules.*



**Smile**  
BY STEVEN G. KERNS, DDS

## Fly the Gridlocked Skies

In "Are We Airborne Yet?" (Start, Atlas, issue 16.01) you say most airport delays "can be traced to antiquated air-traffic control technology." The air-traffic control system isn't the issue. The real problem is how airline operations are structured: Hub-and-spoke operations impose large demand for short periods of time because multiple departures in one direction during "rush hours" create en-route congestion. Airlines want to reduce costs, and they blame the air-traffic control system for their predicament.

**Cris DeWitt**  
AUSTIN, TEXAS

## Ain't Nothing Like the Real Thing

Frankly, digital effects often look cold, isolated, and disassociated from the rest of the action ("Formula for Disaster," issue 16.01). Crushed salt falling over a miniature cliff looks more like a real waterfall than digital water. A quarter-scale model always fools the camera. The Hollywood brass often take the digital path because it impresses investors even though there's a cheaper, far more convincing analog solution. Digital effects can only be described as "awesome" when you never realize they're effects in the first place.

*Excerpted from comment posted on [Wired.com](http://Wired.com) by Vexxarr*

**UNDO** A bag of bones that appeared in a photograph in "The Bone Factory" (issue 15.12) contained tibias and femurs, not just femurs. **RANTS** Letters should include writer's name, address, and daytime phone number and be sent to [rants@wired.com](mailto:rants@wired.com). Submissions may be edited and may be published or used in any medium. They become the property of WIRED and will not be returned.

## Music on Tap

In "The Angry Mogul" (issue 15.12), Doug Morris describes how the big labels feel about music downloading: "If you had Coca Cola coming through the faucet in your kitchen, how much would you be willing to pay for Coca Cola?" Well, Mr. Morris, guess what comes out of my faucet? Water. Why then do beverage companies continue to post record sales of bottled water? They add value to a commoditized product and give the consumers something they actually want to buy.

Universal should try that and stop moaning about how they and the other big labels are selling the best buggy whips. Consumers have had to pay \$15 for one good song and nine craptastic ones for decades. That model is outdated. Give consumers what they want instead of trying to figure out how to sell them only what you want them to have.

**Neal Masri**  
RICHMOND, VIRGINIA

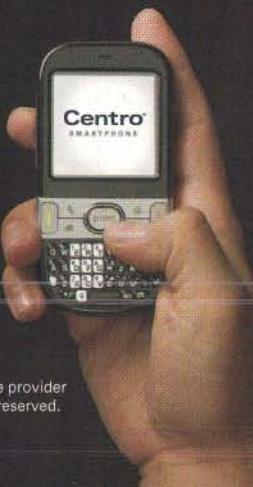


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## Let My Video Go

Dear Hollywood studios, if you follow the lead of the music industry and hold digital downloads hostage, the pirates win. **by Frank Rose**

**IT'S EARLY DECEMBER**, and you've been watching DVDs of *The Wire*, HBO's addictive crime drama, for four hours. Now it's past midnight, and you've just finished season three. You're hooked and ready for more, but season four is nowhere to be found. The DVD set was recently released, but neither Barnes & Noble nor the local video store has it yet, and anyway, they're closed. Netflix offers it, but that would mean a three-day wait for the DVDs to come by mail. Amazon Unbox? iTunes? Netflix Watch Instantly? Not available. Only one place will deliver *The Wire* right now: BitTorrent.

If this sounds familiar, it's because we've already suffered through the same frustration with the music industry. Nine years ago, MP3s were opening up entirely new possibilities for sharing, discovering, and listening to music. But instead of capitalizing on the advantages of digital files, the major labels (fatter than ever from CD sales) started suing. When they grudgingly agreed to Apple's plan for the iTunes music store, it was only under »

WIRED

the condition that tracks come burdened with digital rights management software. That's right, of all the possibilities the Net had to offer, music executives became obsessed only with online theft. That meant people couldn't get the songs they wanted the way they wanted unless they turned to peer-to-peer services—which they did by the millions. And while DRM did not stop pirating, coupled with the incredible popularity of the iPod, it did give Apple a lock on legal downloads. Today, their industry in shambles, music execs are trying to turn back the clock, remove DRM, and finally give us what we should have had in 1999.

Now let's take a look at the home-video industry. Apple has brought movie rentals to iTunes, Amazon is selling and renting movies online, Netflix has started digital down-

loads, and Comcast has promised almost everything-on-demand eventually. We have the bandwidth, the compression algorithms, and the Ethernet connections—not to mention TiVos, Apple TVs, and Vudus—for downloading movies directly to the TV. We should no longer have to drive to the video store or wait for the mail carrier. But that's not the case. The entertainment industry is blowing it once again.

Entertainment executives tend to find what they expect to find. If they fear theft,

## The lessons for Hollywood from the music fiasco are clear: Trying to limit or fight the inherent advantages of digital files is a losing strategy.

loads, and Comcast has promised almost everything-on-demand eventually. We have the bandwidth, the compression algorithms, and the Ethernet connections—not to mention TiVos, Apple TVs, and Vudus—for downloading movies directly to the TV. We should no longer have to drive to the video store or wait for the mail carrier. But that's not the case. The entertainment industry is blowing it once again.

To succeed in the digital realm, Hollywood needs to offer total convenience, almost infinite choice, and the freedom to watch any way we want. Instead, we have iTunes, which delivers video you can't watch on any portable device that wasn't made by Apple, and Amazon Unbox and Netflix's Watch Instantly, which feature downloads you can't watch on any device that was made by Apple. And with a mere 1,000 downloadable movies for rent on iTunes, fewer than 5,000 on Amazon, and around 6,000 on Netflix, none of them offers anything close to the 90,000 DVDs available by mail. They can't, because Hollywood is determined to protect DVD sales at the expense of electronic downloads. That needs to be fixed—because if people don't find what they want at online storefronts, pirate copies are just a click away.

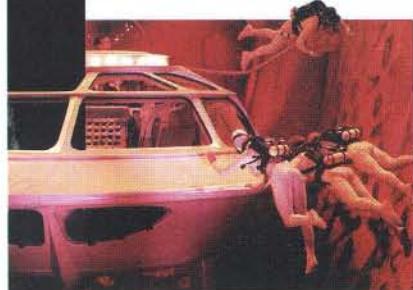
The lessons from the music fiasco are clear: Trying to limit the inherent advan-

they'll see piracy; if they're looking for opportunity, they'll discover ways to profit. The music labels ignored the opportunity for so long that it has all but evaporated. The television and film industries still have a shot, but they need to move fast. Instead of hiring lawyers to lobby Congress and sue their customers, they need to set their legal minds to untangling messy rights issues and rethinking those profitable yet restrictive pay-TV deals. That way everyone would win: Customers would get what they want, the industry would make more money, and consumer electronics companies could innovate without fear of attack. Instead we have Rick Cotton, general counsel of NBC Universal, railing in a recent online debate against the "tidal wave" of illegally duplicated content that "simply must be reduced in any kind of law-abiding society." How to accomplish that? With digital locks, of course. Cotton is right on one point: A tidal wave is just what digital delivery brings—a tsunami of content, illegal and otherwise. But he needs to heed his own analogy. Locks can make you feel safer, but they won't keep you from drowning in a tidal wave. ■

Contributing editor **FRANK ROSE** (frank\_rose@wired.com) wrote about alternative reality games in issue 16.01.



## WTF?! Microbots With Heart



Finally, *Fantastic Voyage* is becoming reality—well, almost. Rather than mini Raquel Welches scuba diving through your veins, picture teeny-tiny insects. Researchers at the Korea Institute of Science and Technology are building six-legged robots small enough to skitter through your blood vessels. The critters can crawl for up to 10 days, no batteries required. Their biocompatible skeletons—made of the same stretchy stuff that's in Silly Putty—are plated with heart cells from rats. When immersed in a glucose solution, the cells beat in synchrony. With each pulse, the bot's back legs contract, pushing the bug forward at a "speed" of 100 micrometers per second (50 meters a week). Lead scientist Sukho Park believes such devices could be injected into humans to treat cardiovascular disease as early as 2020. Once inside a clogged vessel, the bot would feed off the glucose in the blood as it creeps along the length of the artery, releasing a dissolving agent to clear blockages and plaque. Sure, but how will it look in a formfitting wet suit? —LISA FREEMAN



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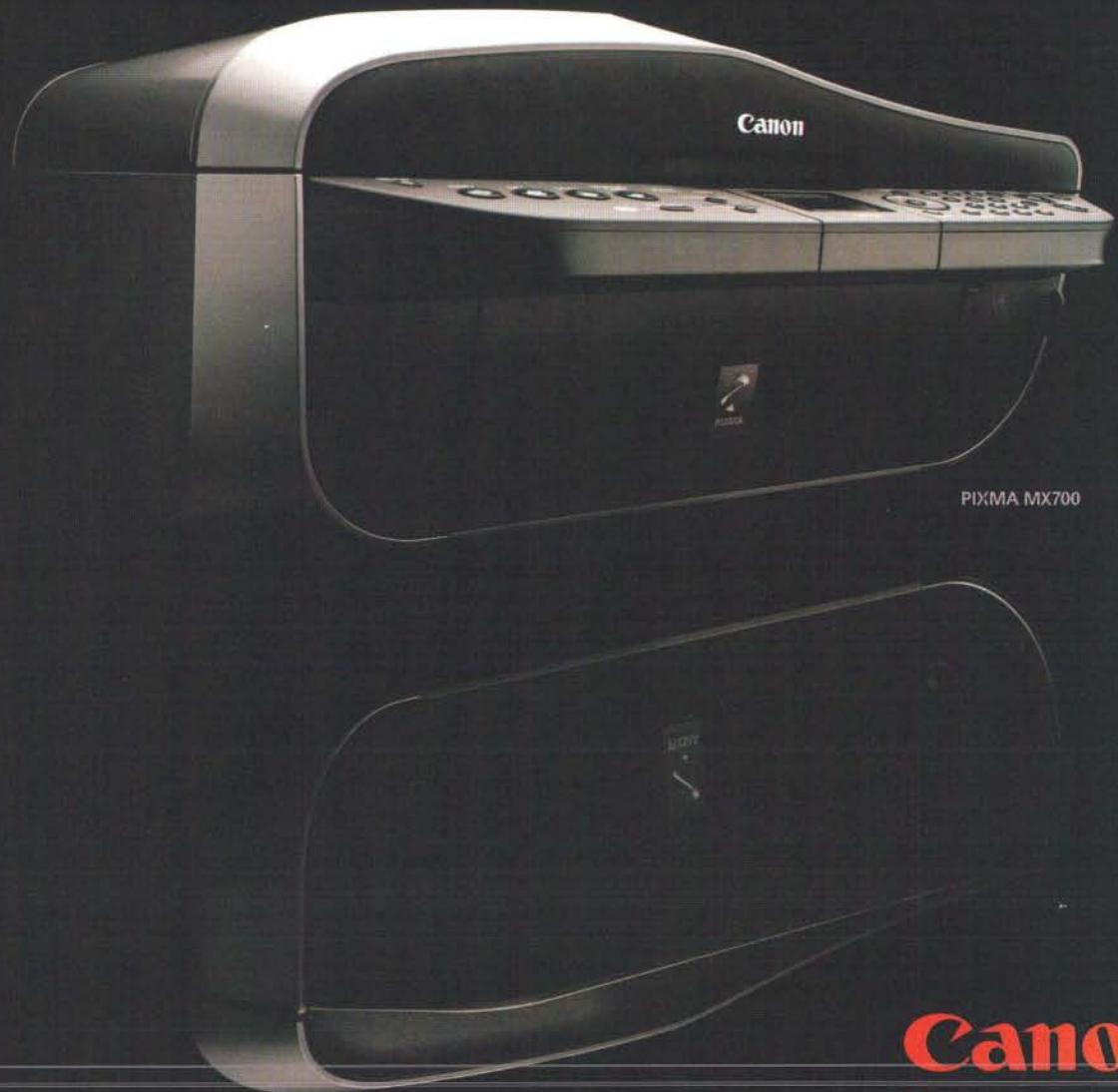
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## 100% GENETICALLY ANALYZED

DNA is the book of life. It's also the book of death. In the future we'll all be read cover to cover.

Here's what it's like to take the world's first top-to-bottom gene scan.

by David Ewing Duncan  
Photographs by the Numbers

## Most Viewed

It all started with niche bands on MySpace. In "The Hit Factory" (November 2005), contributing editor Jeff Howe predicted: "Today the record business, tomorrow the rest of the entertainment industry." True. Nowadays, all kinds of acts are riding the Net to stardom—like these three Web celebs. —Erik Mailinowski

**ANJELAH JOHNSON**'s impersonation of her manicurist hit the Net in early 2007. By summer (millions of streams later) *MADtv* had invited her to join its cast.

**JAMES ROLFE** began producing the *Angry Video Game Nerd*—a series of farcical reviews of old-school games—as a joke. It's now the eighth-most-subscribed YouTube channel, and Viacom's GameTrailers site has added the show to its lineup.

**TILA TEQUILA** is no lonely girl: With over 2.7 million MySpace friends, she's the Internet's queen bee. And virtual popularity scored her a reality show. The finale of *4 Shot at Love* (a bisexual *Bachelorette*) was last season's highest-rated series telecast.



## Prescription for the Future

IN 2002, WHEN WIRED sent David Ewing Duncan to get the world's first top-to-bottom gene scan for disease markers, he called it a "sneak preview of a trip to the DNA doctor, circa 2008." Well, as usual we were a little too far ahead of our time. Gene scanning isn't yet standard practice. But over the past six years, medicine has been inching closer to Duncan's vision of a future where prescriptions are custom-matched to a patients' DNA. Take the anticancer drug Purinethol: A variant in a

gene called TPMT causes one in 300 childhood leukemia patients to suffer life-threatening side effects from the med. So in 2004, the FDA required that Purinethol's label recommend genetic screening—which helps persuade insurance companies to cover the \$395 scan.

In August 2007, the FDA made a similar recommendation for warfarin, a drug designed to prevent fatal blood clots but which can cause internal bleeding in patients with particular DNA mutations. How-

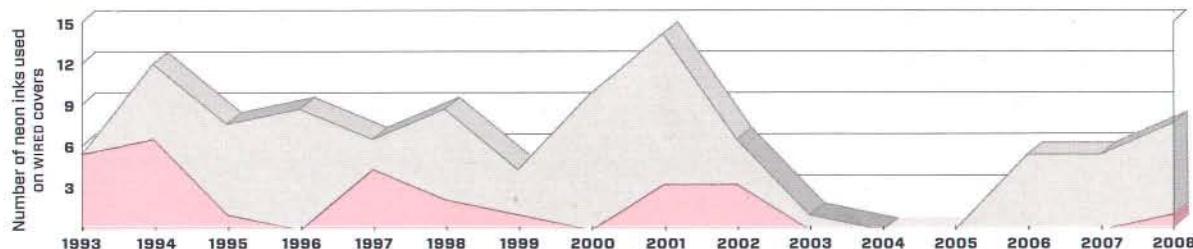
ever, like all pharmacogenetic tests, the scan for warfarin tolerance isn't readily available. Blood samples must be sent to a lab, and as Francis Collins, former head of the Human Genome Project, points out, patients at risk for blood clots can ill afford to wait a week for results.

In the next two years, Collins expects many more discoveries of DNA variations that affect our response to drugs. But there could be millions of them, so progress will likely creep along—gene by gene, pill by pill—starting with drugs that can either kill you or save you depending on dose. Collins is quick to quote the late futurist Roy Amara: "We tend to overestimate the effect of a technology in the short run and underestimate the effect in the long run." —JULIE SLOANE

## We Used to Be So Bright

Until this issue, our onetime signature neon orange-red (designers know it as Pantone 805) hadn't graced a WIRED cover in years.

Pantone 805  
The 13 other neon inks



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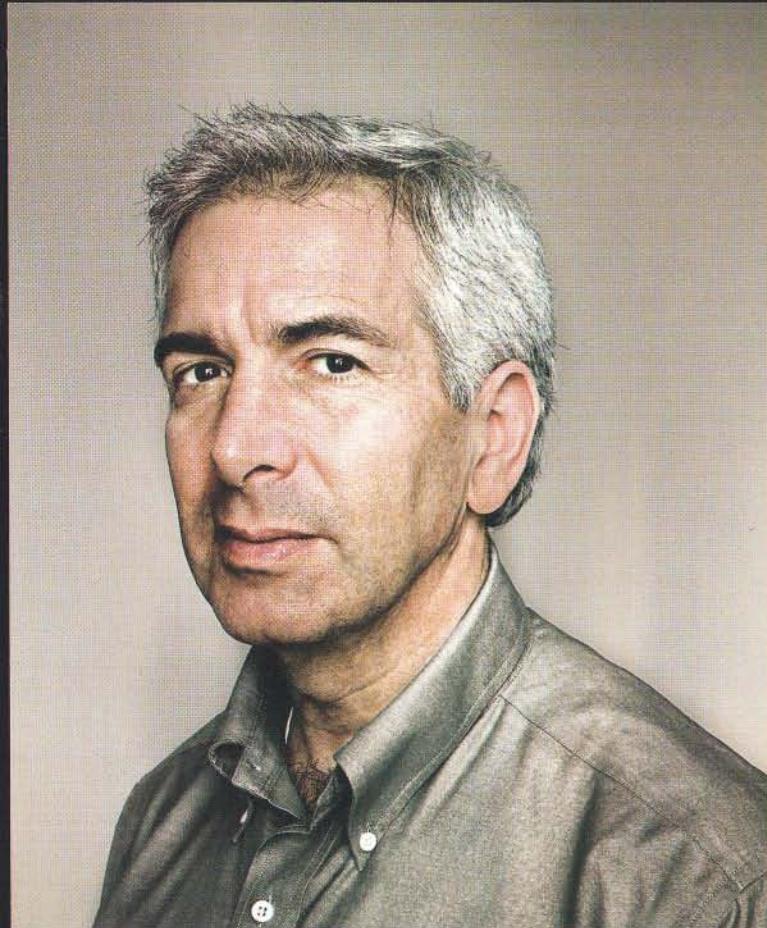
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## Seeing Green

FRED KRUPP ISN'T your typical tree hugger. Chided by radicals for wooing corporate partners, the president of the Environmental Defense Fund is revered in Silicon Valley for championing a capitalist approach to clean energy. His new book, *Earth: The Sequel* (with Miriam Horn), spotlights the most promising climate solutions, from nanotech to flying windmills. WIRED asked Krupp how these technologies can compete. —Amanda Griscom Little

### Explain the title of your book.

We've put Earth at the brink of climate calamity, thanks to rapid industrialization and market forces. That's part one. The sequel is how we get out of this fix. I believe it's those same forces, innovation and profit—and nothing else—that can stop global warming.

### How so?

In 1992, the EDF worked with Bush

Sr. to craft a market system to reduce acid rain. It spurred a revolution in sulfur dioxide scrubbing technologies. The costs were projected at up to \$2,000 a ton, but after 10 years they were down to about \$100 a ton and emissions were slashed by 50 percent. In 2005, George W. Bush signed off on an additional 70 percent cut. Why? The costs proved so low,

the political controversy had disappeared. I suspect the same thing can happen with a cap on global warming emissions once the incentives are right.

### What kind of cap?

A legal limit that requires reductions of at least 20 percent from current levels by 2020, ratcheting up to 80 percent by 2050. That'll give new technologies the chance to flower.

### But won't our economy get hammered by China and India?

It's inevitable that those countries will adopt caps, too. We will gain a competitive advantage by going first. The real question is, do we want to import clean tech from Germany, Japan, and China or export it to the rest of the world?

### How fast will industry's costs decline?

I can't say without claiming to know more than I do, but I know that capitalism works, that American entrepreneurialism works, and we can damn well expect that private capital—not government money—will actually solve this problem.

### Why are so many of the leaders of the energy revolution the same folks who led the dotcom boom?

It's the mindset: Silicon Valley entrepreneurs are willing to take risks. And many of the energy technologies are founded in computing sciences. But the energy business is much more capital-intensive than Web apps. And ultimately, clean tech is a much more important revolution. We're talking about the future of humanity, not how to find a date on the Internet.



## Jargon Watch

### K-Scale

*n.* Korea Scale, the definitive psychological measure of Internet addiction. In South Korea, where an estimated 30 percent of minors play online games compulsively, a high K-Scale rating can mean 12 days in Internet rescue school.

### Moofing

*v.* Derived from the acronym for *mobile, out of office*. Moofers abandon the workplace between meetings, taking laptop and BlackBerry to the local Starbucks or anywhere else where they can escape interruption by talkative coworkers.

### Knol

*n.* As defined by Google, a knol is a Web page on any subject, individually authored by a self-proclaimed expert (as opposed to collectively edited Wikipedia entries). Different knols on the same topic compete for popularity, Google's notion of accuracy.

### Human Terrain Team

*n.* Social scientists recruited by the US armed forces to interpret tribal behaviors in Iraq and Afghanistan. While the military claims that embedded academics are promoting peace in the Middle East, warfare has broken out in scholarly circles over the ethics of so-called mercenary anthropology.

—Jonathon Keats  
([jargon@wired.com](mailto:jargon@wired.com))





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What's Inside | OLYMPIC EXTERIOR LATEX PAINT



## Coats Walls, Fights Diarrhea

### WATER

Paleolithic cave dwellers mixed clay pigments with spit and urine to create the first paint. The basic tech hasn't changed—we still mix pigments with a liquid binder. Of course, these days most of us slap the stuff on in a uniform coat rather than hand-draw bison on the walls of our three-bedroom colonials.

### ALUMINUM SILICATE

Also called kaolin, this clay mineral was the "kao" in antidiarrheal Kaopectate until 1989. The pigment and thickener clings to uranium compounds, so kaolin-containing products—like glossy magazines—can be slightly radioactive. Olympic must buy the good stuff: There's no radiation here. We checked.

### QUARTZ

Sand. It's used in paint to increase the volume (sand being cheaper than practically every other ingredient except water) and as a flattening agent, taking a bit of the gloss off the shine. Plus, it acts as a hardening element: Nuggets of quartz provide a solid surface for the pigments and acrylics to bind to.

### TITANIUM DIOXIDE

One of the most common pigments for anything white, from paint and paper to skywriting smoke. Small  $TiO_2$  particles reflect nearly all wavelengths of light equally efficiently, causing it to appear white. This mineral also has an incredibly high refractive index—its crystal structure slows light by about 60 percent—making even a thin coat of the substance almost perfectly opaque.

### ACRYLIC VINYL POLYMER

The "latex" in latex paint. Olympic uses a synthetic acetate polymer (i.e., plastic), so it's not made from tree sap. And that's good: Natural latex is an allergen, breaks down when exposed to heat and ultraviolet light, and has its own color (that neutral putty shade of latex condoms—lovely). The plastic stuff is better for thickening the paint and holding up against water and heat.

### CALCIUM CARBONATE

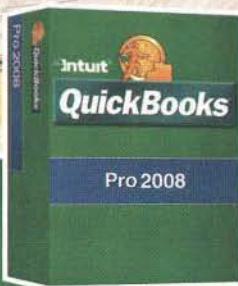
A fancy name for chalk. You might know it as a stomach antacid, a source of dietary calcium, or a lifesaving phosphate binder for people with kidney failure. Here it does triple duty as a thickener to help the paint flow smoothly, a desiccant to promote faster drying, and a cheap pigment (like  $TiO_2$  grains, it's the right size to scatter all wavelengths of light, but costs much less). —PATRICK DI JUSTO



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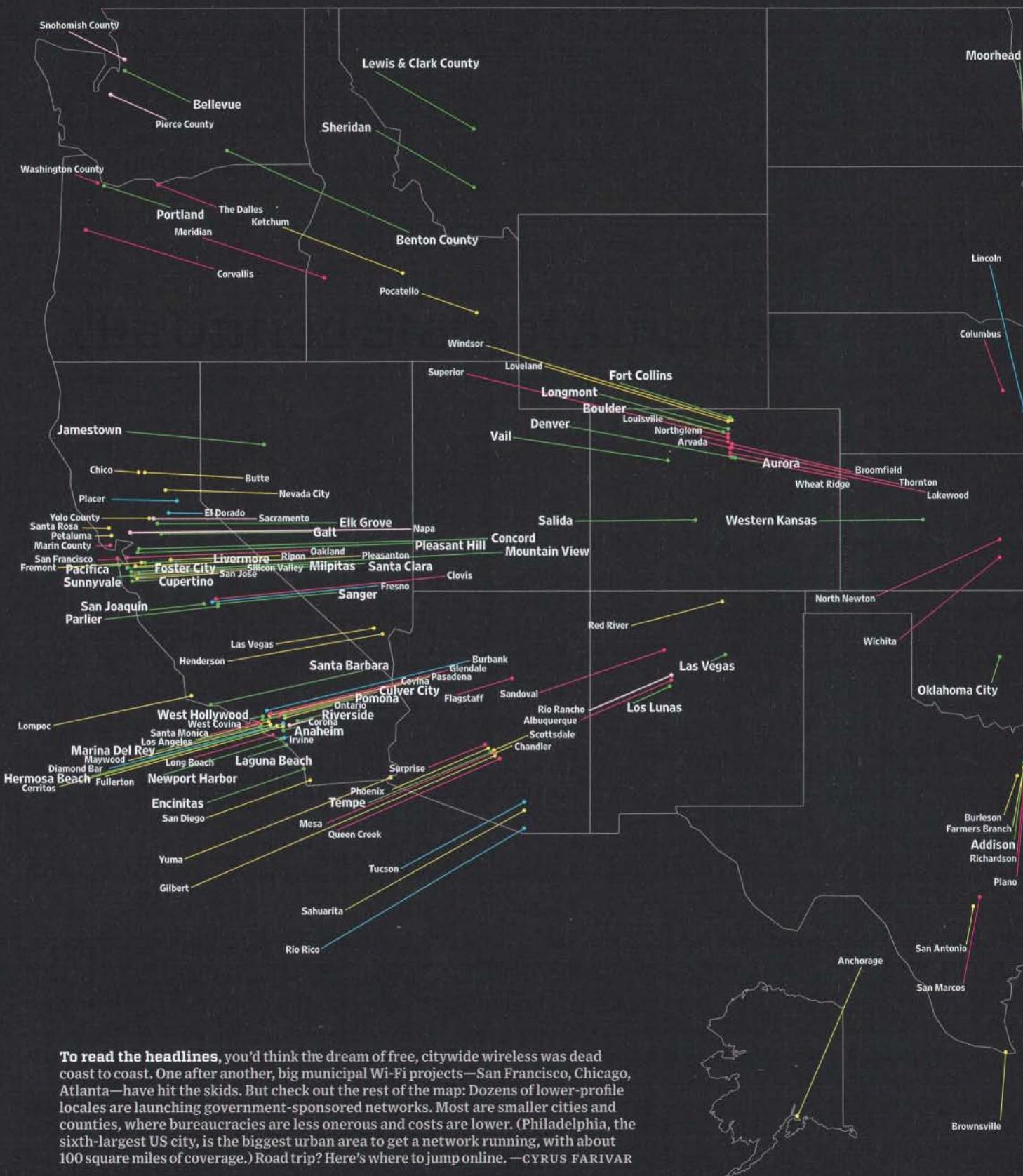
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# The Untied State of America



**To read the headlines**, you'd think the dream of free, citywide wireless was dead coast to coast. One after another, big municipal Wi-Fi projects—San Francisco, Chicago, Atlanta—have hit the skids. But check out the rest of the map: Dozens of lower-profile locales are launching government-sponsored networks. Most are smaller cities and counties, where bureaucracies are less onerous and costs are lower. (Philadelphia, the sixth-largest US city, is the biggest urban area to get a network running, with about 100 square miles of coverage.) Road trip? Here's where to jump online. —CYRUS FARivar

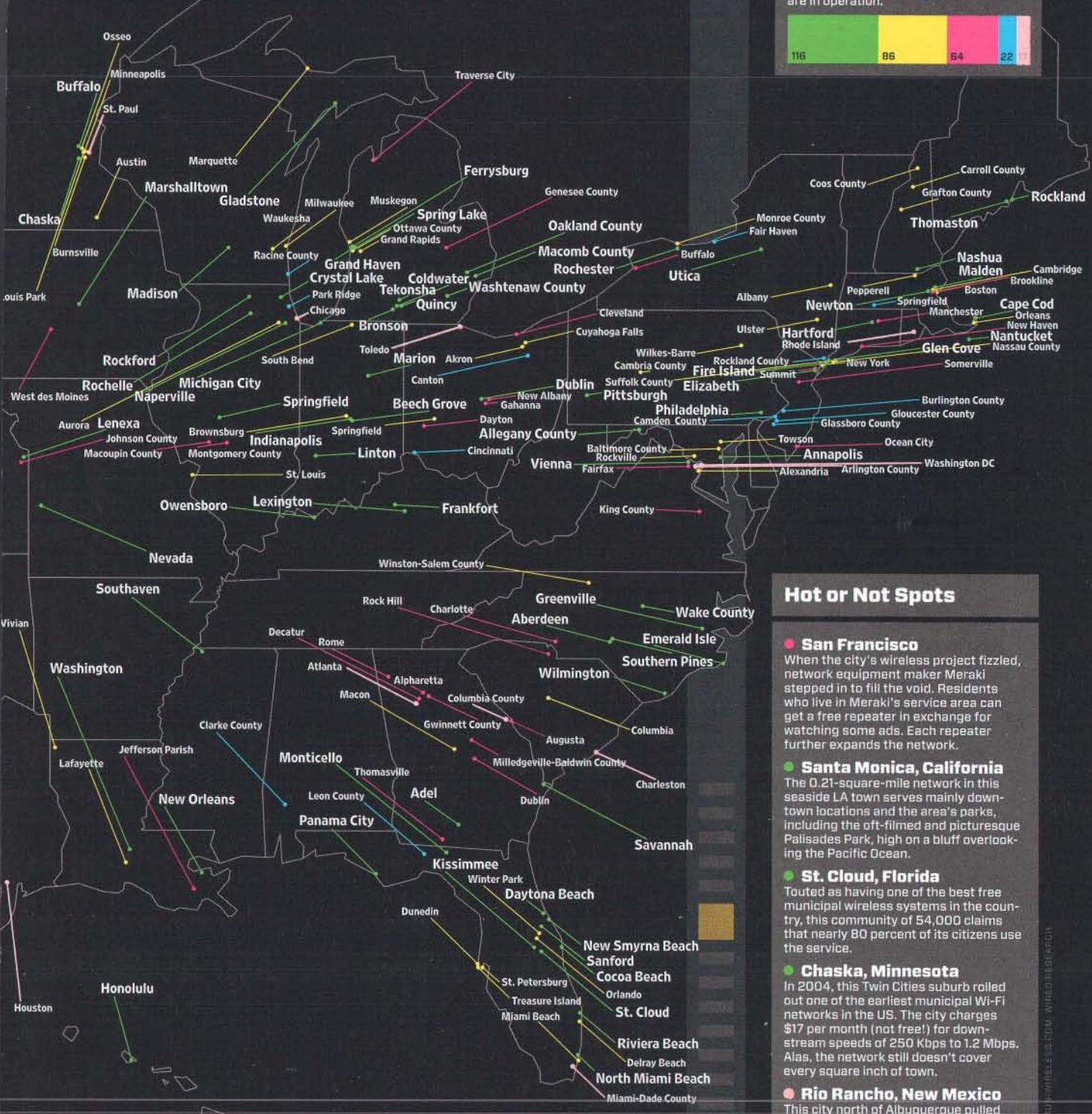


Atlas

## Network Status

- In operation
- Under construction
- Early stage of development
- Under consideration
- Dead or on hold

More than a third of the nation's 300-plus municipal Wi-Fi projects are in operation.



## Hot or Not Spots

### ● San Francisco

When the city's wireless project fizzled, network equipment maker Meraki stepped in to fill the void. Residents who live in Meraki's service area can get a free repeater in exchange for watching some ads. Each repeater further expands the network.

### ● Santa Monica, California

The 0.21-square-mile network in this seaside LA town serves mainly downtown locations and the area's parks, including the oft-filmed and picturesque Palisades Park, high on a bluff overlooking the Pacific Ocean.

### ● St. Cloud, Florida

Touted as having one of the best free municipal wireless systems in the country, this community of 54,000 claims that nearly 80 percent of its citizens use the service.

### ● Chaska, Minnesota

In 2004, this Twin Cities suburb rolled out one of the earliest municipal Wi-Fi networks in the US. The city charges \$17 per month (not free!) for downstream speeds of 250 Kbps to 1.2 Mbps. Alas, the network still doesn't cover every square inch of town.

### ● Rio Rancho, New Mexico

This city north of Albuquerque pulled the plug on its Wi-Fi network late last year after a dispute with its wireless ISP, Azulstar.

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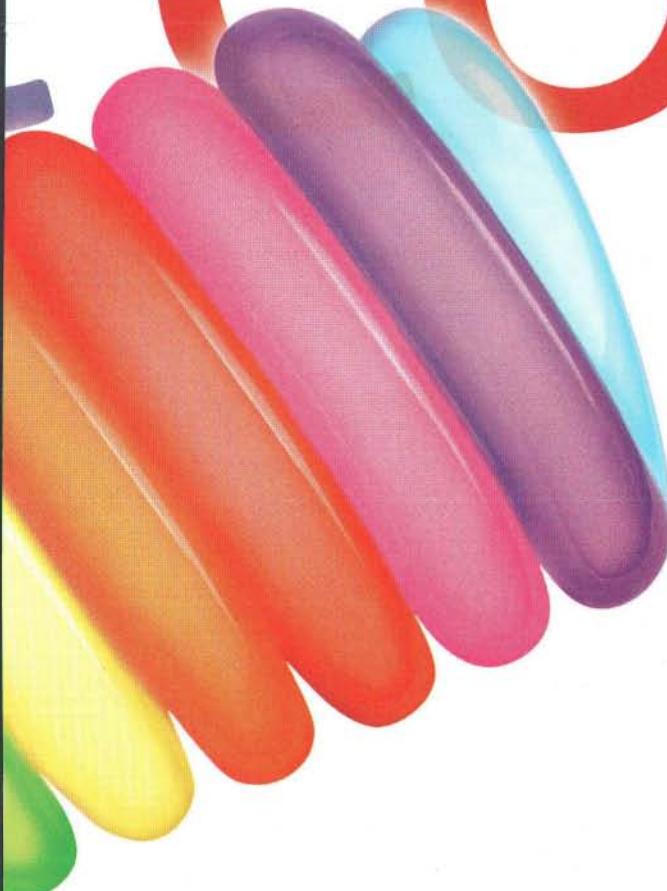


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## Joint Chief

**What it is:** Blue Line Automatic Taper

**What it's used for:**  
**High-speed filling and taping of seams between drywall panels**

If you do serious work around the house, you've probably dealt with drywall. Most DIYers tackle the seams between Sheetrock panels armed with a trowel, a roll of tape, and a bucket of gooey joint

compound. Those people are suckers. Professional drywallers use automatic taping machines, known in the trade as bazookas, like this swanky \$1,725 Blue Line. Holding more than half a gallon of compound in its cylinder, the device goops on the "mud" and embeds paper tape as it's rolled along the seam; a shotgun-like cocking motion cuts the tape. The main tape wheel drives a chain, which cranks a spool of 200-pound-rated steel cable to draw a plunger up the cylinder, like a giant caulking gun that never overshoots. And it's made of aluminum and stainless steel, so even caustic joint compound won't easily corrode it. With a full load of compound, the tool can fill 80 feet of seams in 10 minutes. It's not uncommon for pros to finish a 1,000-square-foot space in a single day. How much of an advantage is that? Until 2005, bazookas were banned by drywallers' unions in Australia. — BOB PARKS



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# How To...Fly Through Airport Security

You might as well check your dignity curbside. Soon you'll be shoeless and flustered, spilling comics across the floor as you dig your MacBook from the depths of your duffel. But take a deep breath, frequent fliers: It is possible to pass security with your ego intact. Here's how. —MATHEW HONAN



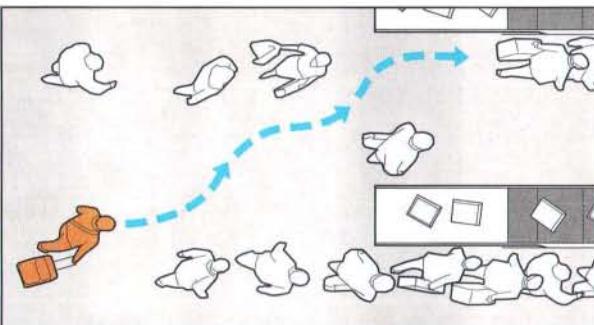
**1) DO RECON ONLINE.** Security delays vary widely by concourse and terminal. Go to [tsa.gov](http://tsa.gov) to find average wait times. If you're not checking bags, print your boarding pass at home and head to the fastest line. (Be sure your gate is accessible from that security checkpoint.)



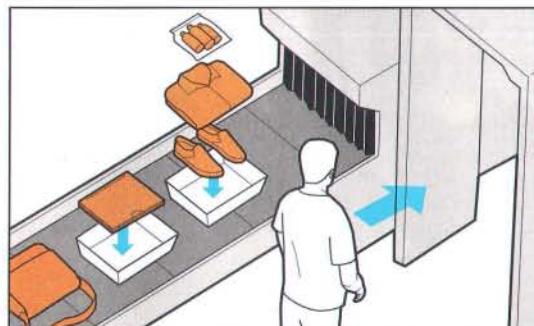
**2) CARRY A MESSENGER BAG.** The topside flap gives easy access to your laptop and Ziploc of liquids and gels while the pockets provide plenty of storage for alarm-trippers. As soon as you get in line, tuck your belt, wallet, keys, watch, and phone into the sack.



**3) WEAR LACELESS SHOES.** And holeless socks. Just think of all the foot fungi of travelers past. Or don't.



**4) GO!** After you pass ID screening, make a beeline to the shortest x-ray queue. Don't wait to be directed, and don't hesitate to bypass dawdlers. Not only will you get there faster, you'll keep the whole line moving.



**5) USE ONLY TWO BINS.** Place shoes, coat, and toiletries in the first bin; laptop in the second; followed by the messenger bag. Keep the roller on the floor, where it's easy to manage, until the last minute.



**6) DRESS STRATEGICALLY.** Don your coat and shoes while waiting for your bags. Put on your belt and watch at the gate.



## ...Survive an Avalanche

Your odds of outrunning the snow? Not so good. An avalanche can accelerate to 80 mph in seconds. But if you follow these tips, you might just walk away from it.

### 1) GRAB A TREE

The more snow that slides past you, the less likely you'll be buried alive. Hang on for dear life until the force knocks you off.

### 2) PADDLE HARD

You are three times denser than dry snow, so if you're not swimming, you'll sink.

### 3) CREATE SPACE

Once the snow stops, it'll set like concrete. As it slows, inhale to reserve room for the expansion of your chest, and cup a hand around your mouth to leave an air pocket.

### 4) RAISE A HAND

Before the flow ceases, get a limb to the surface to help rescuers find you. Between 15 minutes and 45 minutes under the snow, your odds of survival fall from 90 percent to 30.

### 5) BREATHE

**SLOWLY** To delay carbon dioxide poisoning, stay calm and don't bother yelling until rescuers are on top of you. Your fate is now in their hands.

—MIYOKO OHTAKE



## ...Break Up on Facebook



blast the gossip to all your friends (and "friends"), prompting those pitiful "What happened?" emails. Next time you split, in the "News Feed and Mini-Feed" section of your privacy options deselect "Remove my Relationship Status"; then, in your profile settings, change "In a Relationship" to the default "Select Status." But there's a hitch: Your ex's Mini-Feed will display an update in their relationship status, tipping off the gossip hounds. (You didn't think Zuckerberg would let you off that easy, did you?) You have no choice but to nicely ask your former boo to delete it, ASAP. —M.O.

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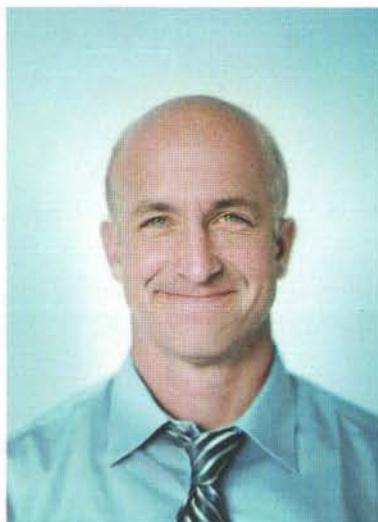


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## Earth to Rocker: Reality Calling

**While commuting to work by train, I often notice people blasting their iPods so loudly they can't hear their cell phone ring. Should I alert these future tinnitus sufferers to the fact that they're missing a call?**

Much depends on the iPodder in question. Do they appear amenable to being roused from their sonic trance? A lot of people rock their earbuds at high volume precisely to avoid human interaction—especially when grumpily traveling to work at 7 a.m. "Commuters plug in because they don't want to be where they are," says Alex Halavais, an assistant professor

at Quinnipiac University who studies the usability of mobile devices. "iPods create a sphere of isolation."

Analyze your fellow rider's disposition. Zombie with a thousand-yard stare and a hint of a scowl? That's nature's way of saying "do not disturb." "But if their body language is different—if there's not a 'back the F away from me' vibe—I would go ahead and do something," says Bryan Chaffin, editor and copublisher of iPodObserver.com.

Ah, but do what? Americans tend to be a little touchy about personal space, particularly pre-caffeine. Peter Post, director of the etiquette-obsessed Emily Post Institute, recommends starting with a simple "excuse me," then escalating to a friendly wave if the target is unresponsive. If that doesn't work, consider your civic obligation fulfilled and go back to reading your copy of *Busybodies Quarterly*.

**As the stressed-out mom of a newborn, I often find myself craving a glass or three of cabernet. But I'm breast-feeding. Am I looking at another six to eight months of involuntary teetotaling?**

Caution is certainly called for, as hooch does, indeed, seep into a kid's nutritional supply. The good news is that an occasional glass of wine shouldn't be a problem, as long as you don't have another feeding slated for a while. The effects of liquor vary widely according to the drinker's weight and metabolism, but a general rule of thumb is that the concentration of alcohol in breast milk peaks around 60 minutes after ingestion. Play it safe: Wait two to three hours per drink before nursing Junior.

You might want to be extra cautious, however, if your breast monkey is less than 3 months

J  
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Jim Sturgess  
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21

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old; the youngest livers have a tough time metabolizing alcohol. It's also prudent to avoid the more potent vintages—zinfandels tend to have a higher percentage of alcohol than Rieslings, for example. Check the label before pouring.

But what if there's a special occasion approaching and you'd like to celebrate with more than one tipple? First off, don't go crazy—breast-feeding with a hangover is as much fun as doing anything else with a hangover. More important, pump plenty of milk in advance, and be prepared to pump and dump—pump milk and throw it away—should your breasts become full before the alcohol clears your system. Milk alcohol level declines at the same rate as blood alcohol level, so whenever you're back to 100 percent sober is when you can safely nurse.

Bottom line: Enjoy a glass of wine, and don't panic. But you should probably wait to really tie one on till after your child has been weaned. Don't worry—at that age, they'll still provide plenty of reasons for you to need a stiff drink.

#### Am I less of a man if I use the automated parallel parking on my Lexus?

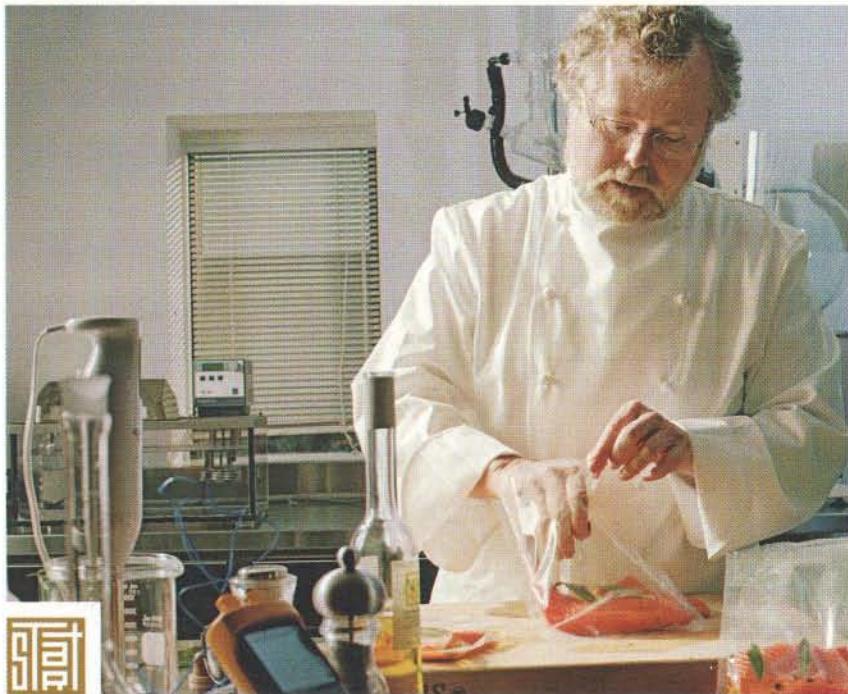
"Here's a list of things adult men should not do: order flavored coffee, use 'hair products,' and rely upon electronic aids

for parallel parking," says Craig Fitzgerald, editor of *Hemmings Sports & Exotic Car*. He is seconded by Peter De Lorenzo, publisher of *Autoextremist.com*, who suggests that using Lexus' advanced

parking guidance system means "your car-guy credential needs to be yanked."

In other words, if your goal in life is to impress auto aficionados, then you best shimmy into that space yourself. On the other hand, hey—you can afford a Lexus! Those guys are journalists. You could probably buy them four times over and still have enough left for a big bottle of Kiehl's Creme with Silk Groom to tame that cowlick. **W**

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## Tech Chef Tips

An ex-Microsoft genius masters *sous-vide*.

FOR NEARLY FOUR YEARS, an obscure culinary discussion forum called eGullet has had an anonymous guru of *sous-vide*. The technique—which involves using vacuum-sealed plastic bags to cook foods in water at precisely controlled temperatures—is both relatively new to the home chef and poorly documented. But thanks to user "nathanm," eGullet offers a wealth of insider knowledge, everything from comprehensive tables of cooking times to tips on food safety. ¶ So who is this mysterious Jedi Master? Turns out, nathanm is über-technologist Nathan Myhrvold, former CTO of Microsoft and noted billionaire. Myhrvold first encountered *sous-vide* at a culinary school in France, but he found the lack of practical information frustrating. "I wanted to figure out how long to cook things," says Myhrvold, now CEO of the "invention" firm Intellectual Ventures. "I did some experiments and then wrote a program using Mathematica to model how heat is transferred through food." ¶ Myhrvold says he's working on a cookbook covering *sous-vide* and other new culinary techniques. But until that's finished ("It will be done someday," he promises), here are some of his tips for *sous-vide* Padawans. —Mark McClusky

**Don't bother with a lab-quality thermal circulator.** For at-home fare, check out the temperature controllers at [auberins.com](http://auberins.com), which can be used with a rice cooker. You'll also need a vacuum sealer, like the FoodSaver.

**Cook short ribs forever.** "I love to cook short ribs at 130 degrees Fahrenheit for 36 hours," Myhrvold says. "They become very flavorful and have a different texture than most braised meats."

**Don't be tricked by the color of your fish.** Fish can be particularly interesting. "Cook salmon at 102 to 104 degrees for 20 minutes," Myhrvold says. "It will look raw but have the texture of cooked fish."

**Finish with fire.** To brown, wait until you're done with the water bath and then apply high, local heat. "A really hot pan works," Myhrvold says, "but a blowtorch is best."

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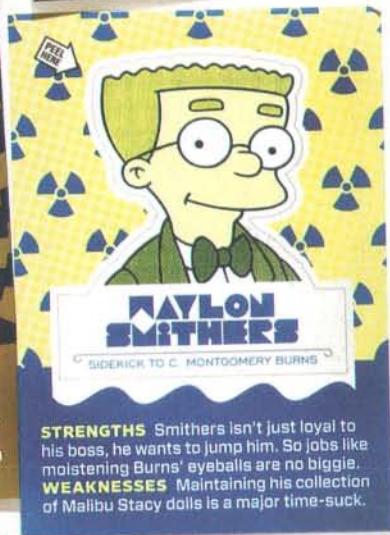
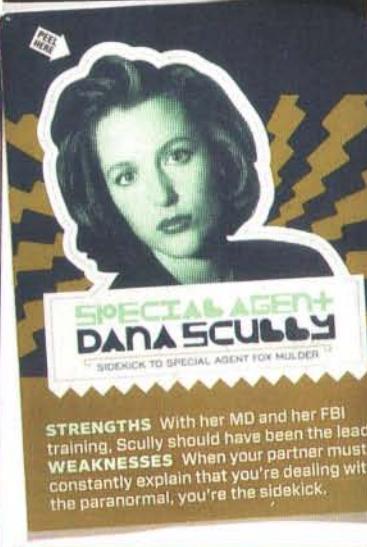
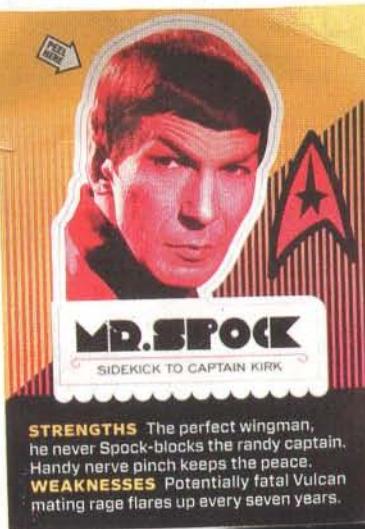
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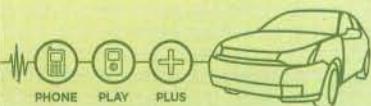


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# Drive-By Shooter

Cinematographer Richard Welnowski is a one-man film studio, delivering hi-def footage to indie auteurs everywhere.

RICHARD WELNOWSKI HAS A PLAN to revolutionize the independent film industry. He keeps it in the back of his 2003 Ford Expedition. Sick of seeing big budgets choke the creative freedom of young directors, Welnowski—the technical wiz behind the pioneering animation/live-action kids' TV series *LazyTown*—built his own half-million-

dollar mobile studio, outfitting the 4x4's cargo bay with a DVS Clipster recorder, 24-inch monitor, and MacBook Pro with Final Cut. Hook all that to a DC-to-AC inverter sucking power from the engine, add a couple of Thomson Viper cameras (uncompressed digital HD footage), and you have a rolling postproduction facility that can capture and edit flawless timestamped scenes as soon as the director yells "Cut!" No more waiting for dailies, no more expensive outsourcing.

Welnowski can film for two days straight on a single tank of gas.

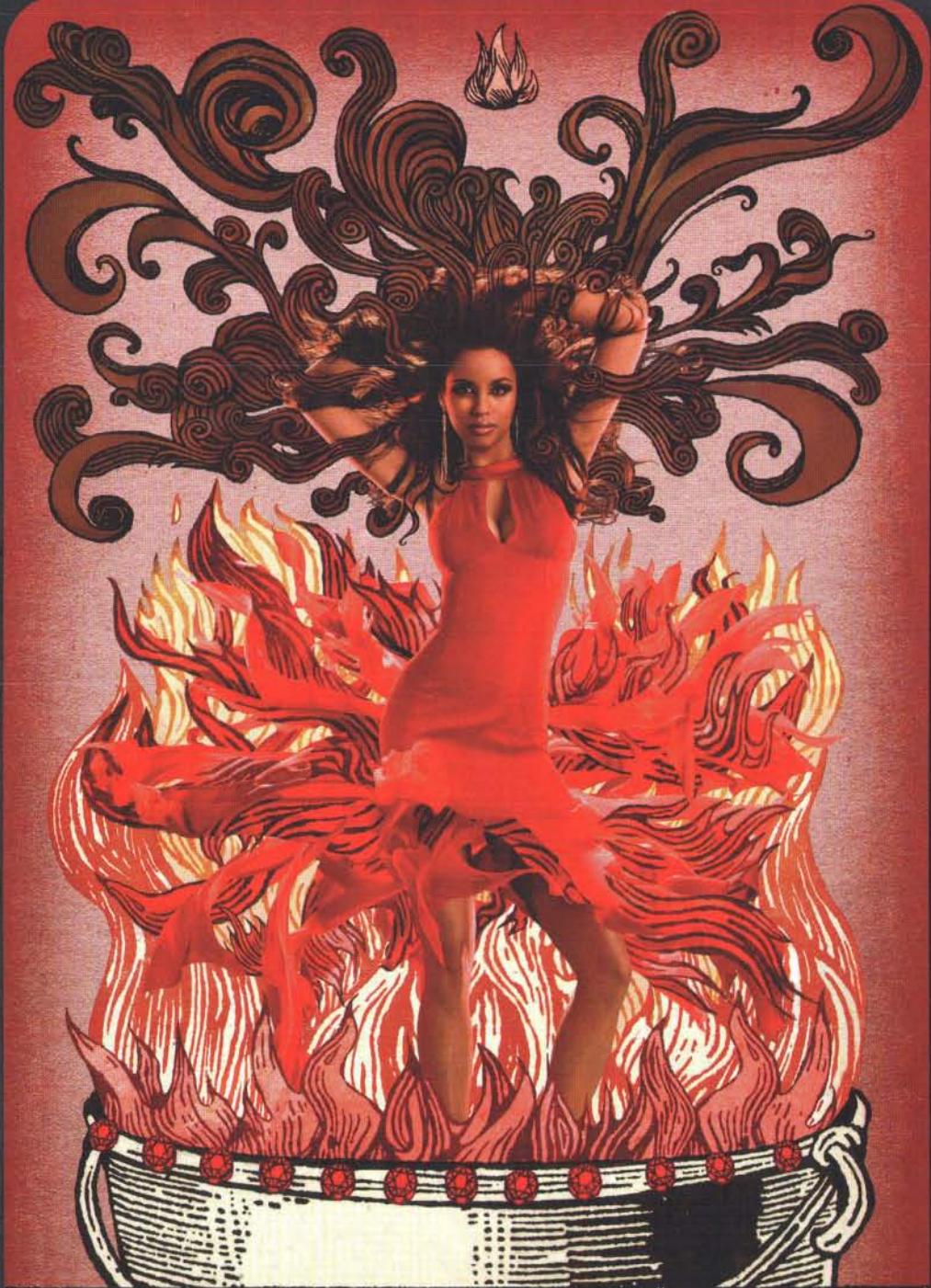
Based in Kansas City, Missouri, the cinematographer has already clocked more than 24,000 miles, shooting in Mississippi bogs for the National Geographic Channel's historical war series *A Day Under Fire* and chasing storms across the Midwest for *Nail Biter*, an upcoming \$1.1 million thriller about tornadoes. "Directors come to me because they have a dream but they don't know how to shoot it," Welnowski says. And they want to save money. He charges an average of 10 percent of the total production cost (usually in the low six figures)—"catering money" to a big studio and cheap enough to make digital hi-def available to indie auteurs. "We have to make sure every minute has exceptional value," he says. The drive-in theater may be dead, but drive-by shooting may be the future of moviemaking. —BEN PAYNTER



## Japanese Schoolgirl Watch: Virtual Teen Idol

Miku Hatsune is one of Japan's hottest new pop sensations. Since last August, the 16-year-old's cute soprano voice has been near the top of the charts—the software charts. Hatsune, whose full name means "first tone of the future," is a vocal-synthesizer app created by Yamaha and based on audio data sampled from anime voice-actress Saki Fujita. The program lets aspiring music nerds create pitch-perfect vocal tracks by simply entering the lyrics (in Japanese or English) and musical notes. The AI superstar can be heard singing dozens of tunes on YouTube. Strangely, though, no sign yet of "Mr. Roboto." —ASAMI NOVAK

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Known for their outrageous blending of comedy and magic, which often skewers the genre of traditional magic, Penn & Teller's live show has been a hit on Broadway and has a permanent home in Las Vegas right here at the Rio All-Suite Hotel & Casino! Edgy, provocative, and hilarious, this iconoclastic pair's live show on any given night can involve knives, guns, and a fire-eating showgirl. Known as the "Bad Boys of Magic" for supposedly revealing the secrets to their tricks, they may show you how it's done, but they still manage to leave you startled.

### VOODOO LOUNGE: PLAY ABOVE THE VEGAS SKYLINE

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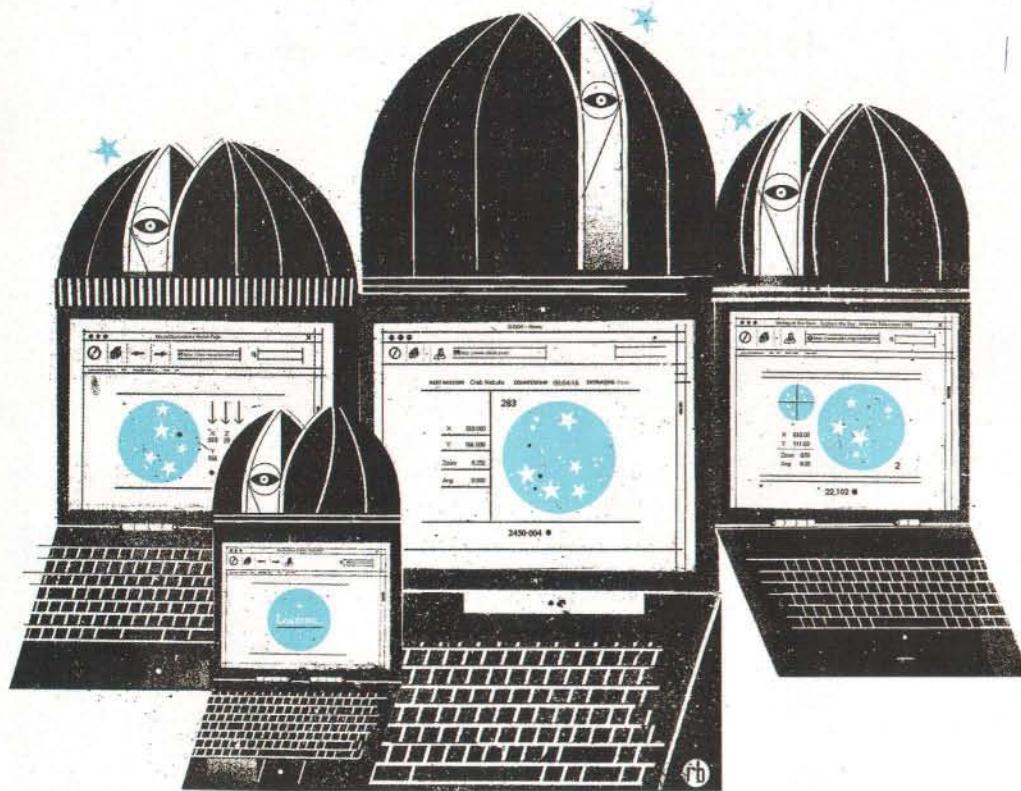
\*Mention this promotion in your email to ensure entry in the BALL Fireman drawing.

The **SXSW Music & Media Conference** showcases hundreds of musical acts from around the globe on over seventy stages. By day, registrants do business in the Trade Show and attend informative, provocative panel discussions featuring hundreds of speakers of international stature. **2008 Keynote: Lou Reed**

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TELESCOPE 14-inch-diameter Schmidt-Cassegrain  
LOCATION Tenerife, Canary Islands  
FIELD OF VIEW From the north celestial pole to 52 degrees south  
PICTURES BACK IN Days, sometimes weeks  
RESULTS 1,056 x 1,027-pixel color or black-and-white JPEGs  
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LOCATION Cambridge, Massachusetts, and Amado, Arizona  
FIELD OF VIEW Northern celestial hemisphere to 48 degrees south  
PICTURES BACK IN Days, often overnight  
RESULTS 650 x 500-pixel black-and-white GIFs  
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[www.pbs.org/seeinginthedark/explore-the-sky](http://www.pbs.org/seeinginthedark/explore-the-sky)  
TELESCOPE 14-inch-diameter Schmidt-Cassegrain  
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FIELD OF VIEW Northern celestial hemisphere to about 45 degrees south  
PICTURES BACK IN Days to weeks  
RESULTS 512 x 512-pixel black-and-white JPEGs  
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## 3 Smart Things About Currency

**1** The average \$1 note retires from circulation after 21 months, while coins kick around for some 30 years. It costs more than three times as much to produce a \$1 coin, but government accountants say that switching from dollar bills to dollar coins still makes a lot of sense—more than 50 billion cents a year, to be exact.

**2** You may have enough cocaine in your wallet to attract a drug-sniffing dog. Studies indicate that blow can be found on between 70 and 100 percent of US bills. Of course, that doesn't necessarily mean your green-backs were used to snort the stuff. ATM mechanisms quickly spread the dust across the entire money supply.

**3** More and more, investors are trading bucks instead of stocks. Since 2004, the number of currency transactions has grown 71 percent. For long-term profits, your best move is to buy and hold moneys from resource-rich countries like Australia, New Zealand, and Canada. But not the euro—Europe's wunder-coin has to fall ... eventually.

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# Our Germs, Ourselves

Humans are crawling with microbes. That's not all bad.

Your body is a wonderland—for bacteria, viruses, and fungi. Trillions of tiny organisms live on our skin and in our mouths and guts. The so-called microbiome weighs as much as an average brain and its members outnumber our own cells by a factor of 10. Many are kin to pathogens like strep, staph, and *E. coli*. But some are downright indispensable: digesting food, making essential nutrients, and strengthening our immune systems. Meet our little friends. —GRETA LORGE

MICROBES PER SQ CM



## FOREHEAD

Microbes per sq cm: 1 million

*Propionibacterium* loves the fatty acids in oily skin. As many as 100,000 of the beasties can hide out in a single hair follicle. The body's natural defense against these bacteria? White blood cells—the goo inside a zit. Nearly 50 different microbe phylotypes make themselves at home in your epidermis.



## MOUTH

Microbes per sq cm: 1 billion

Halitosis is caused by specific oral bacteria like *Atopobium parvulum* that like to loiter on your tongue. They ferment the proteins and peptides in saliva and residual bits of food and produce foul-smelling sulfur compounds.



## COLON

## COLOR

Microbes per sq cm: 1 billion to 100 billion

In the food supply, *Escherichia coli* is bad news. Mutated strains are responsible for more than 60 deaths a year in the US. But in the colon, a mild-mannered form of *E. coli* helps your body produce necessary nutrients like folic acid and other B vitamins. Nearly 200 different microbe phylotypes are living large in your large intestine.



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\*E85 ethanol is 85% ethanol, 15% gasoline. To see if there is a station near you go to [chevy.com/e85](http://chevy.com/e85). †Assumes fully charged battery. Actual range may vary depending on driving habits and conditions. Vehicle features and performance capabilities subject to change without notice. \*\*Estimates based on GM simulation data. For more information, go to [chevy.com](http://chevy.com) ©2008 GM Corp. Buckle up, America!



Clive Thompson

# Take Up Thy Tools

Armed with soldering irons and spare electronics, the DIY revolution might just revive American innovation.

WT

My attempts look like mashed insects, and they crack when I try to assemble the device.

Why am I so inept? I used to do projects like this all the time when I was a kid. But in high school, I was carefully diverted from shop class when the administration decided I was college-bound. I stopped working with my hands and have barely touched a tool since.

As it turns out, this isn't a problem just for me—it's a problem for America. We've lost our Everyman ability to build, maintain, and repair the devices we rely on every day. And that's making it harder to solve the country's nastiest problems, like oil dependence, climate change, and global competitiveness.

The decay has been rapid. Only a few decades ago, most serious adults were expected to be fluent in basic mechanics. If your car or stove or radio broke down, you opened it up and fixed it. "Magazines like *Popular Mechanics* in the '40s and '50s would publish projects like an automated pig-feeding trough, and they assumed you had the tools and skills to make it," says Dale Dougherty, editor and publisher of *Make* magazine.

But as we migrated to an information economy, those skills began to seem as quaint as, well, mechanical clocks. America's bright future, we were assured, wasn't industrial. It was in the hands of "symbolic analysts"—folks who sat at desks and thought for a living. In the '90s, the rise of the Internet sent this post-mechanical age into a sort of giddy overdrive. Remember Nicholas Negroponte urging everyone to "move bits, not atoms"?

But when we stop working with our hands, we cease to understand how the world really works.

You see this on a personal level. If you can't get under the hood of the gadgets you buy, you're far more liable to believe the marketing hype of the corporations that sell them. When things break, you toss them and buy new ones; you accept your role as a mere consumer. "I think it makes you more passive as an individual," says Matthew Crawford, a former motorcycle repair-shop owner (and postdoctoral fellow in cultural studies) who's

**hat a mess.** I'm sitting on the floor of my apartment, surrounded by electronic parts, a cigar box, a soldering gun, and stray bits of wire. I'm trying to build my own steampunk-style clock—hacking a couple of volt meter dials to display hours and minutes. It'll look awesome when it's done.

If it ever gets done—I keep botching the soldering. A well-soldered joint is supposed to look like a small, shiny volcano.

writing a book on the demise of mechanical aptitude in America.

It might even screw up our brains. Neuroscientists have shown that working with your hands exercises different parts of your cerebrum than sitting and cogitating. Ever wonder why Detroit isn't producing 100-mpg cars? One reason might be that the engineers there spend all their time tinkering with CAD software—developing design concepts in a purely virtual sense. They aren't ripping open cars to see what's possible, the way those amateur ultra-mileage Prius hackers do (some of whom, by the way, have modded their hybrids to get 100 mpg).

I'd argue there are even larger political effects of our post-atom age. Take the epidemic of corroded highways and collapsing bridges. The basic mechanics of how bridges and roadbeds work are so beyond us that we don't have any sense of urgency about the issue, and we don't put anywhere near enough pressure on our politicians to prioritize infrastructure upgrades.

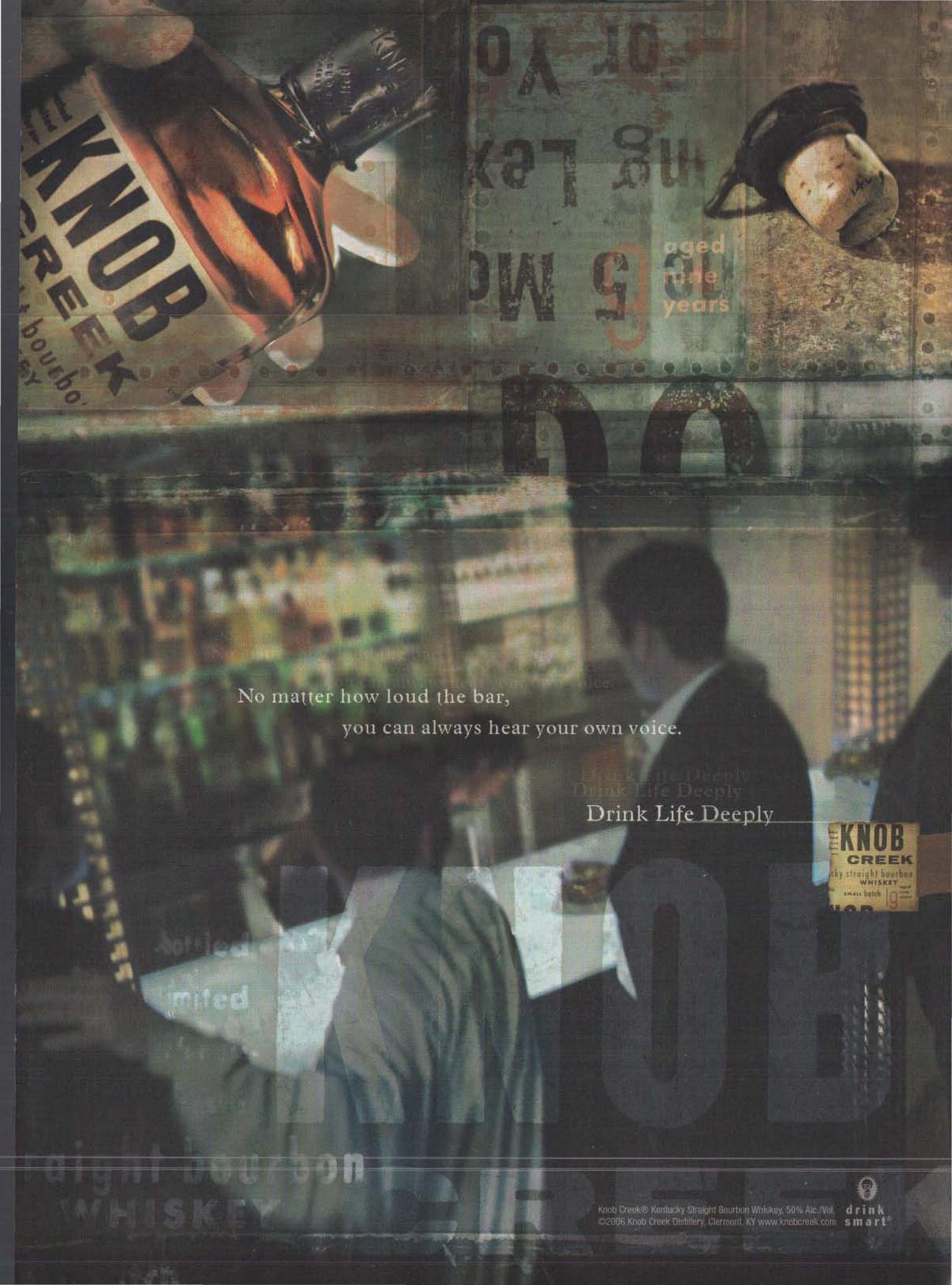
The good news? A counterrevolution is afoot. The past few years have seen an uprising of DIY hobbyists, people who've realized that making stuff is not only cognitively empowering but also a lot of fun. Dougherty's *Make* magazine—which publishes plans for building cardboard guitar amplifiers, board games, and VCR-powered cat feeders—has been a surprise hit, selling 100,000 copies each issue. Weekend robot-building societies are cropping up everywhere. And I can't turn on the TV without stumbling across some extreme home-renovation show, complete with a hyperactive host and loving descriptions of how to, y'know, mix concrete. In prime time!

Notably, all this is happening outside our broken educational system. America is healing itself at the grass roots—rediscovering the mental joy of making things and rearming itself with mechanical skills.

And, hey, I'm doing my part. After a couple dozen tries, I finally get my soldering technique back up to scratch. The clock is telling time—and I made it.



EMAIL [clive@clivethompson.net](mailto:clive@clivethompson.net).



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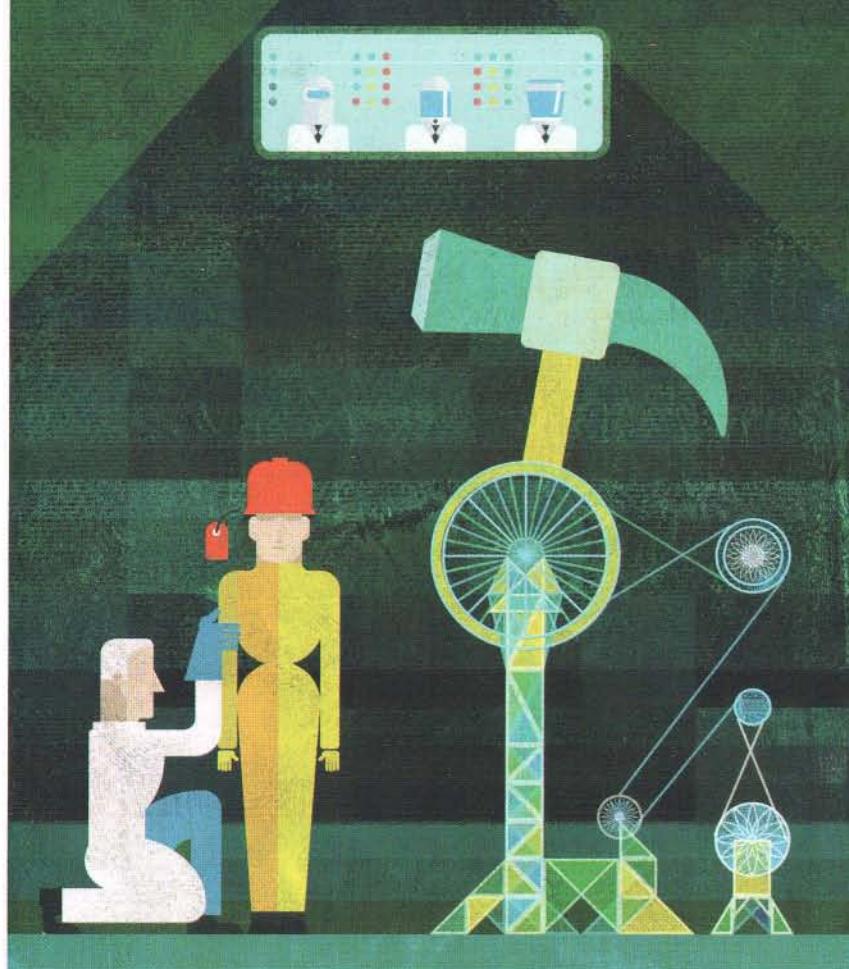
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# Put to the Test

**Consumer Reports' secret shoppers have lots of explaining to do.**

JON IS SHOPPING FOR BEN & JERRY'S vanilla ice cream—nine pints of it. And all need to have rolled off the same production line, on the same date. He enters the supermarket carrying a Styrofoam cooler full of dry ice (to keep the ice cream cold), a pair of gloves (to keep his fingers warm), and a flashlight (to help him see the inkless indentations on the bottom of each container that show where and when it was manufactured). Reaching the freezer section, he sits down and begins stacking ice cream on the floor. "Eventually a stocker comes over," Jon says, recalling the incident. "He's not happy."

Jon is not his real name. He won't reveal his true identity because he is a member of an underground network of nine full-time and 85 freelance shoppers working for *Consumer Reports*. In 2006 (last year's numbers aren't available yet), *CR* tested 3,377 products, drove 85 cars, purchased 572 tires, washed and dried 192 wrinkle-free shirts, and prepared 470 pounds of mashed potatoes. According to the magazine's rigid ethics code, it all has

to be bought by secret shoppers. The cost is considerable: In 2006, the advertisement-free magazine spent \$2,849,349 on cars alone.

Making these purchases without saying why can be tricky. Once, Jon told a phone salesman that he needed a particular model because his mother had Alzheimer's and he'd never be able to teach her how to use a new brand. He laughs when he describes the wary looks he got after filling up a shopping cart

with condoms. He fondly recalls the time he purchased five different washing machines, claiming that his landlord father had given tenants their choice of brands.

But Jon's favorite story by far is the ice cream. With pints stacked on the floor and an angry stocker looming overhead, Jon had to say *something*. "So I go into my Rain Man routine," he says. "'Count the vanilla, count the vanilla, gotta count the vanilla.' Eventually, the stocker just gives up and walks away. And I get my ice cream." Once products are purchased, they're taken back to *Consumer Reports'* Yonkers, New York, headquarters, where the magazine maintains 50 tricked-out, cost-is-no-object laboratories. There are labs where trained tasters sample chocolate, labs where air conditioners are evaluated to see if units are more efficient at blowing cool air to the right or to the left, and labs where strollers are pushed over a series of bumps for hours at a time.

In the case of the ice cream, the pints are handed off to the magazine's sensory group. They'll be just as scrupulous in the testing as Jon was in the buying. "We put things in our mouths that you wouldn't normally put in your mouth," says group manager Maxine Siegel. "We'll use a penny to get a baseline for a metallic taste, Crisco for that fatty mouthfeel, cornstarch mix for a chalky texture. We'll chew on birthday candles to get a sense of wax." That way, she says, "everybody knows what they're talking about."

One down, 3,376 more products to go.  
—SETH MNOKIN

POTS



# 5 Minutes Left

**Algebra. Geometry. Functions. At 38, taking the SAT is tough.**

I'M SITTING IN A SECOND-FLOOR CLASSROOM at Denver East High School, hunched over a desk, exerting a death grip on a No. 2 pencil. My brain is overheating. I have two difficult problems. ¶ This is the first:  $z = x - y + 4$ .  $z = y - w - 3$ .  $z = w - x + 5$ . Based on the system of equations above, what is the value of  $z$ ? A) 2; B) 3; C) 4; D) 6; E) 12. ¶ And here's the second: What object can I use to persuade the pimply 17-year-old sitting next to me to stop with the frickin' whistling? The first time I took the Scholastic Aptitude Test was in 1985. I scored 1,120 out of a possible 1,600, thank you very much:

510 verbal, 610 math. When I signed up to take the test last autumn, I had visions of sweating through a Wi-Fi-enabled, digitally administered, robotically proctored exam that would peer into my deepest soul.

But no. Today's SAT is the same endurance test it was back then: pencils and filled-in bubbles, bored proctors and stuffy study halls, anxiety and panic. "With the SAT, it

turns out paper and pencil are a pretty good way of doing it if you want it available everywhere," says Laurence Bunin, a senior vice president at the College Board, the organization that administers and grades the test.

The biggest recent change is the writing portion, including a 25-minute essay question, added after the University of California threatened to stop using the SAT because

it failed to properly evaluate writing skills. There's debate about whether the section has addressed that concern. MIT professor Les Perelman found that writing longer, with bigger words, is a more felicitous route to a quantitatively greater result. More than half of the 1,000 or so four-year colleges in the US disregard the writing component entirely.

Me, I sort of liked the essay topic: "Can people ever be truly original?" I finished in 15 minutes, then smirked at Pimple Face, who chicken-scratched until the end. Then came the math. I am a 38-year-old writer who uses Google to calculate percentages. Suddenly I was looking at algebra. Geometry. Functions. I stared at the booklet, trying mightily to recall Mr. Willis' fifth-period class. The SAT deducts a quarter point for wrong answers, so I left 10 of the 20 questions blank. Pimple Face finished early. That's when he started whistling.

The worst part is, I even studied. While the SAT itself remains drably low tech, study methods have made great leaps forward. There are online practice exams, emailed questions of the day, SparkNotes' iPod Vocabulary Builder, and an entire review course conducted in Second Life. I'd been lulled into overconfidence by some of these quick-hit, digitized study aids. They certainly didn't hurt, but they aren't the hardcore training one needs. Sadly, on test day I realized that one online practice exam and a few questions of the day are useless preparation for a nearly four-hour exam.

Still, I improved on my 1985 score by 130 points. A 480 in math? Still humiliating. But a 770 in critical reading? Not bad. I notched a 680 in the new writing category, but my score on the essay question—the College Board breaks out a separate assessment—was shockingly low. One grader gave me 4 out of 6 ("adequate mastery"), the other 3 ("displays developing facility in the use of language"). That's 7 out of 12. Overall score: 1,930 out of 2,400. Once again, I made the cut for the University of Michigan... if they overlook the math. When I was in high school I almost certainly would have known the answer to the above problem: A. Today, all I have going for me is wisdom and clear skin. And, thank goodness, access to Google. —STEVE KOPPNER





John Lee

*Co-Publisher, THEME Magazine*

## Ask John Lee Why He Loves His BlackBerry

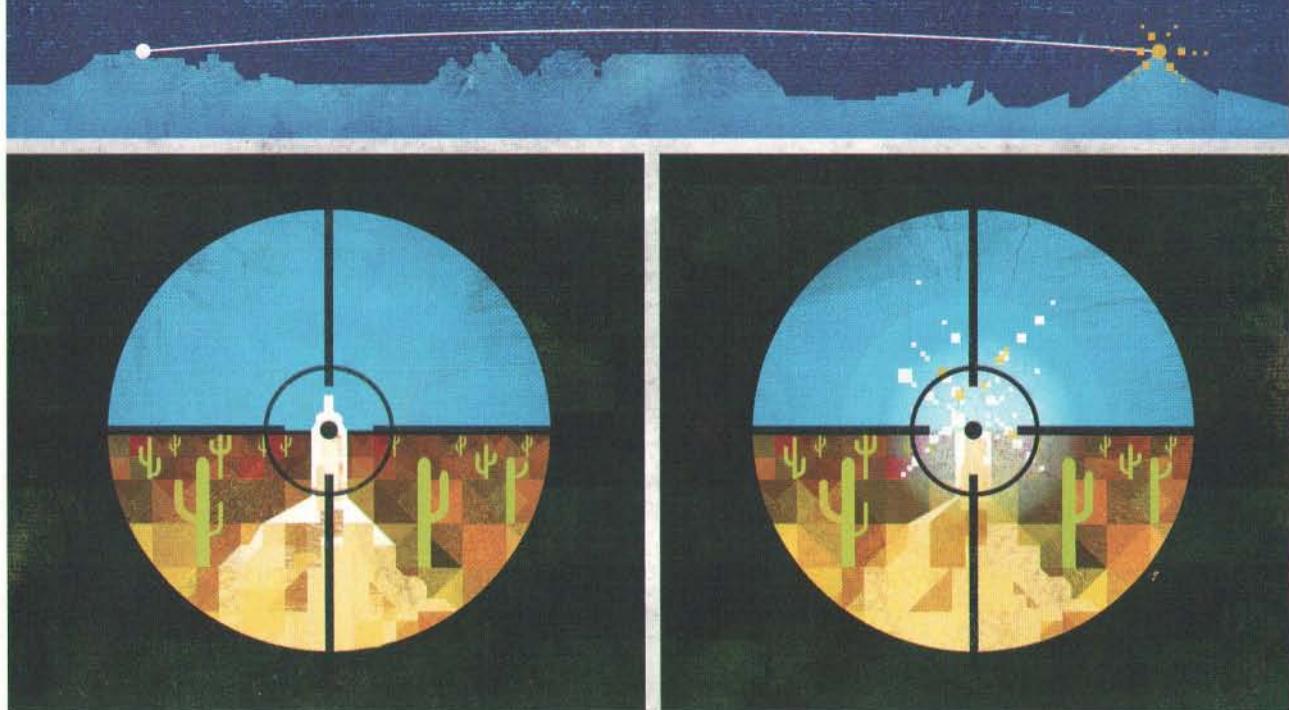
"My wife and I publish THEME, a magazine that showcases worldwide Asian culture. We have a growing, acclaimed business—and a baby on the way. Managing it all can be challenging, but with a BlackBerry® smartphone, it's not as daunting. Our business is small but my BlackBerry 8830 from Verizon Wireless puts me on equal footing with any other business. I chose Verizon Wireless for coverage and reliability. Now I can jet off to Hong Kong with my office in my pocket. That's empowering. That's magic."



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**BlackBerry**



# Point and Shoot

**A goliath sniper rifle may take some of the physics out of war.**

A STEADY WIND BLOWS across the edge of the cliff, but I ignore it. For the average sniper, the breeze might be a variable that matters. But not for me. I'm lying flat on a cactus-spiked ridge above the desert north of Phoenix, clutching a Barrett M107 long range sniper rifle. It's a semiautomatic cannon that spits Macanudo-sized .50-caliber rounds at 2,850 feet per second with enough force to punch through an engine block or decapitate a man from more than a mile out. But the gun's real selling point is physics. Its big kaboom largely obviates the need for DOPE, data on personal equipment.

Putting a bullet into a target takes more than lining up crosshairs—complex equations combine muzzle velocity, ammunition weight, and ballistic coefficient with environmental factors like wind speed and air temperature. But the M107 is so powerful, all I have to worry about is gravity and not flinching when I pull the trigger.

William Graves, owner of GPS Defense Sniper School, teaches Army Airborne soldiers how to use this 5-foot-long gun. He has invited me to this sunbaked backcountry to experience it myself. I'm wearing two types of ear protection—earplugs and an electronic decibel-filtering headset—because the M107's report can be deafening. At a safety briefing earlier this morning, Graves was disturbingly tactical: "Hold the gun tightly when you fire or it will kick and

break your nose. If anything happens, take as many gauze rolls as you can and stuff them directly into the wound. If it's something to do with high-caliber rifles, it's going to be catastrophic."

I shiver as Graves scans the terrain and points to a speck on a hillside 700 yards across the canyon. Through the crosshairs of my 14X Leupold Mark 4 scope, it resolves as a head-sized rock. I wedge the stock into my shoulder and hug it tight.

Then a little math. Bullets don't fly forever—they fall in a shallow parabolic curve. Using a ballistic chart that Graves pulled off the Internet, we twist the elevation knob to lower the scope 14 minutes of angle (1 MOA equals 1 inch per 100 yards). I'm now aiming about 8 feet above the target. Hitting the rock should be simple. Advises Graves: "Move

the trigger without moving the rifle."

I disengage the safety, wink into the scope, and feel the sting of cold metal against my cheek. I twitch my finger.

*Blam!* Air punches me in the face, and the recoil shoves me backward. My ears are ringing. In the distance, I see a puff of dust between cactuses. I have flinched. Actually, cowered would be a better description.

It happens again and again. To scrub and soil, I am deadly. To the rock, I am no threat. Graves tells me I'm tensing up, shaking the rifle ever so slightly in the split second before I fire. The trick? Graves teaches me the "surprise break" firing technique. If you pull the trigger slowly you never know when it will engage—so you can't freak out.

My next shots go wide, 2 feet to the left. Graves shifts the horizontal windage knob a few clicks right to align the scope and steps back. "Fire when ready."

I draw in the trigger languidly, making small talk with myself as seconds tick past. One ... If this were a real insurgent, he'd certainly be gone by now. Two ... And if he were hungry, like me, he'd head to the McDonald's 6 miles up the high—*POW!*

No dirt splash. Nothing moves.

"What happened?" I ask.

"That's what happens when you hit something," Graves says.

I peer through the scope. The rock is gone.

—BEN PAYNTER

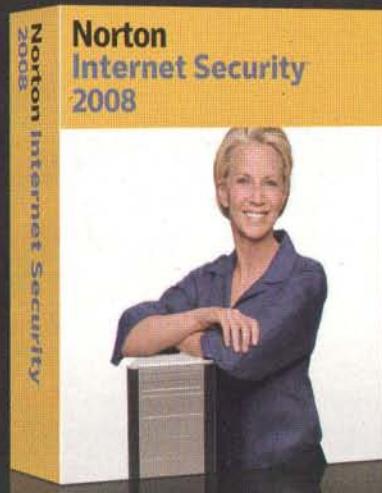
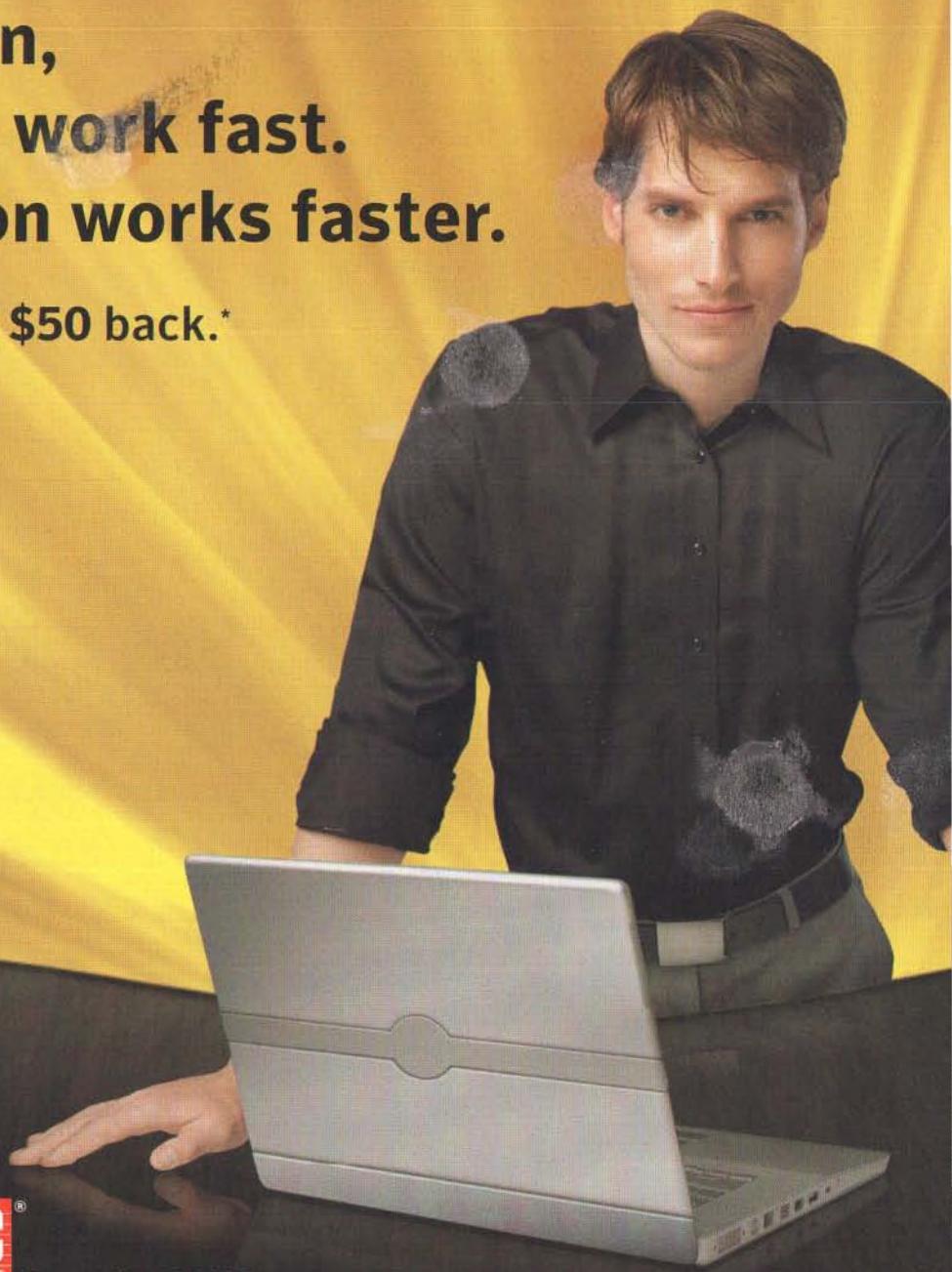


Weaponry



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# 1



## Stargate: The Ark of Truth

When *Stargate: SG-1*—the TV version of the 1994 movie—called it quits last year after 10 seasons, we grieved. But Teal'c, the tough-guy team stalwart, would have wanted us to soldier on. So we resigned ourselves to the goofier spinoff series, *Stargate: Atlantis*. Now, thank the Asgard, a new direct-to-DVD movie picks up right where *SG-1* left off, with our heroes fighting the dreaded Priors of the alien Ori. And it feels like teleporting home. Every planet in the universe is still comfortably Pacific Northwestern. Everyone speaks English. And our favorite cast members from other science fiction shows still stop by. (*Farscape*? Check. *Serenity*? Check.) We just wish Richard Dean Anderson had reprised his role as the reliably smart-assed Colonel Jack O'Neill. Because if there's one thing we miss more than *SG-1*, it's *MacGyver*.

## 2

### March Madness On Demand

Stuck in your cubicle while your alma mater is making hoops history? You could track your picks on any number of sites, but only [NCAA.com](http://NCAA.com) will feature live, streaming, and totally free coverage of March Madness, brought to you by the good people at CBS Sports. And if meetings pull you away from your PC, there'll be a full selection of highlights and recaps waiting for you, so you'll always know where you stand in the office pool.

Playlist | WHAT'S WIRED THIS MONTH



# 3



### Beyond Ultraman: Seven Artists Explore the Vinyl Frontier

You just want to squeeze 'em: Ice Bat, Uglydoll, Tankizando, and Bossy Bear (shown) pose for this exhibition catalog of cute-as-hell art toys inspired by the Japanese TV superhero. Vinyl *kaiju* (monster) dolls scream mutely into the abyss, while saucer-eyed dragons in blue, pink, and orange share face time with a red-hot devil child and tattooed "homie" action figures. If you didn't catch them at the Pasadena Museum of California Art, here's another chance.

# 4

## Groom Mate Platinum XL Nose and Ear Hair Trimmer

They say the biggest obstacle to happiness is small annoyances that you're forced to endure regularly. Like grooming with electric nose-hair trimmers. This stainless steel cutter ditches batteries for a manual twist system that ends ouchy ripping and pulling. It's pure bliss.



### 6 Blu-ray

The format war is over, and this time the better tech won. The death match between Blu-ray and HD DVD came down to studio support, and with Warner Bros.' announcement that it'll be Blu-ray-only by mid-2008, Sony's format locked up 70 percent of the production houses. And unlike VHS (which bested the technically superior Betamax), Blu-ray really is the more future-proof format, with greater storage space to handle inevitable increases in the size and resolution of films.



## 8 Vinturi Essential Wine Aerator

Sommelier duty got you down?

Take a cue from the tasting rooms in Napa and Sonoma that save time by insta-aerating their bigger, more tannic reds. The funnel-like Vinturi, which uses Bernoulli's principle of fluid dynamics to introduce more air into the mix, noticeably improves the wine's nose and balance. Now your vintage has enough time to breathe in just the time it takes to pour.



Playlist

## 100 Days of Monsters

It's a blot, it's a blog, and now it's a book. When Stefan G. Bucher transformed random inkblots into bug-eyed freaks and posted a new creation each day at [dailymonster.com](http://dailymonster.com), visitors to the site began hallucinating—er, imagining—backstories for his drawings. The book compiles fans' Rorschach-style musings on creatures like Eatus Yurheadus, Three-Legged Grinner, Horsequito, and Radioactive Mutant Spice-drop. Scrumptious.

**5 Blood +: Part One** This beautifully animated series, now on DVD, quenches our anime thirst with its supercute sword-swinging heroine (in school uniform, natch), mutant vampires, covert military ops, and enigmatic cello-playing guardian. Directed by *Ghost in the Shell*'s Junichi Fujisaku,

*Blood +* dishes up emo drama and appendage-hacking action.

## B-52's: Funplex

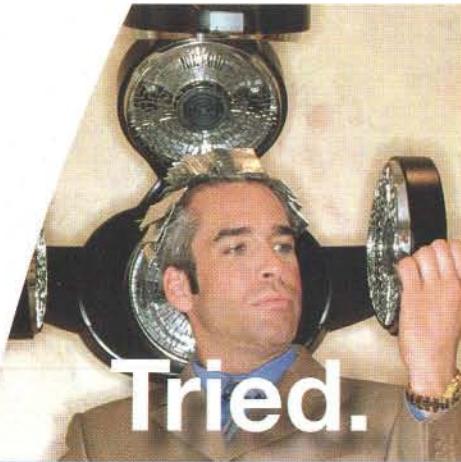
Long before the Rapture set dance floors aflame, the B-52's got Gen-X teenagers fruggin'. Their new album's electro-synths and catchy club-ready disco hooks have catapulted the rock lobsters' classic sound into the 21st century. Clearly their tin roof isn't that rusty.



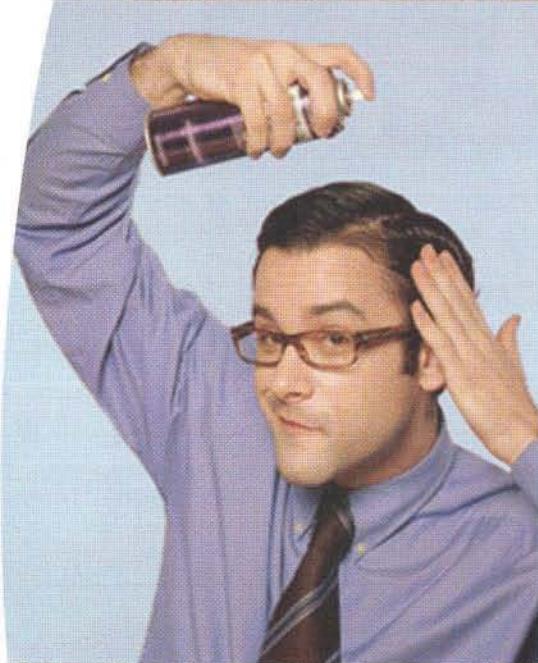
# 10

## Design and the Elastic Mind

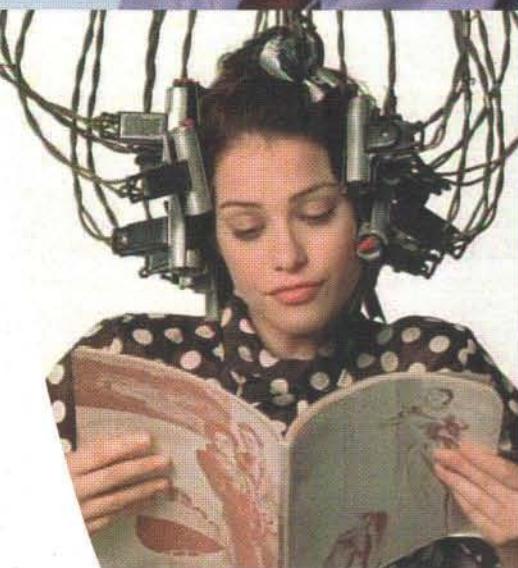
James King likes to play with food. On display as part of MoMA's *Design and the Elastic Mind* exhibit, his work explores what our grub could look like if it grew in petri dishes instead of on the factory farm. Enjoy a helping from the mobile animal MRI (above), which scans the tastiest bits of beef, pork, and chicken, creating cross-sectional images of the inner organs. Who wants seconds?



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# And the Winner Is...

We present the Oscars for outstanding achievement in the art of the movie trailer.



It's been seven years since the Academy of Motion Picture Arts and Sciences added a new category to the Oscar accolades: Best Animated Feature. We think it's time Hollywood created another: Best Movie Trailer. Thanks to the rapt attention they've gotten through YouTube, MySpace TV, and Apple.com, coming attractions have evolved into a cinematic art form all their own. Many are better edited, scored, and art-directed than the films they're selling—not to mention that you can watch them online for free. The following WIRED honorees are approved for most audiences. —*Brian Raftery*



BEST DIRECTOR



BEST DIRECTOR

**TIE: SYLVESTER STALLONE (RAMBO); PAUL THOMAS ANDERSON (THERE WILL BE BLOOD)** Before this spring, the only thing that Sly and P.T. had in common was coming within striking distance of Burt Reynolds' ferocious toupee. But both of these auteurs wisely decided to release very early (and very creepy) trailers directly to fan sites, rather than waiting to showcase them in theaters. As for which was more effective, it's a draw: *Blood* introduces Daniel Day-Lewis' John Huston-by-way-of-Mr. Burns accent, while *Rambo* features Stallone actually punching a guy's head off. So, you know what? You're both winners. OK? Now just don't hurt us.



BEST PICTURE

**THE DARK KNIGHT** The online teaser for Chris Nolan's hotly anticipated sequel was a delectable treat for Batfans, but the six-minute "Prologue" shown before the special IMAX screenings of *I Am Legend* last December (featuring the late, great Heath Ledger's Joker redux) was a meal in itself. Here's to lengthy, tantalizing sequences becoming the future of coming attractions.



BEST CINEMATOGRAPHY



BEST ADAPTATION



BEST VISUAL EFFECTS



BEST FILM EDITING

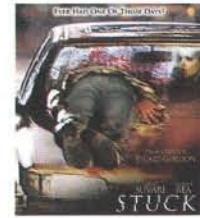
**CLOVERFIELD** Few people even knew *Cloverfield* existed until its trailer materialized in front of *Transformers* last July. Once audiences saw the Statue of Liberty's head being rolled down a Manhattan street like a 7-10 split, *Cloverfield* became the most buzzed-about movie of the summer and a winter box office hit.

**KNOCKED UP** Judd Apatow wasn't the first director to revive the red-band trailer, which allows violence, sex, and, here, Seth Rogen's foul mouth seemingly on repeat. But the racy *Knocked Up* preview was a must-rewind last spring, and now every release aimed at teens and twenty-somethings includes a red version.



Screen

## Reviews



### THEATERS

#### Stuck

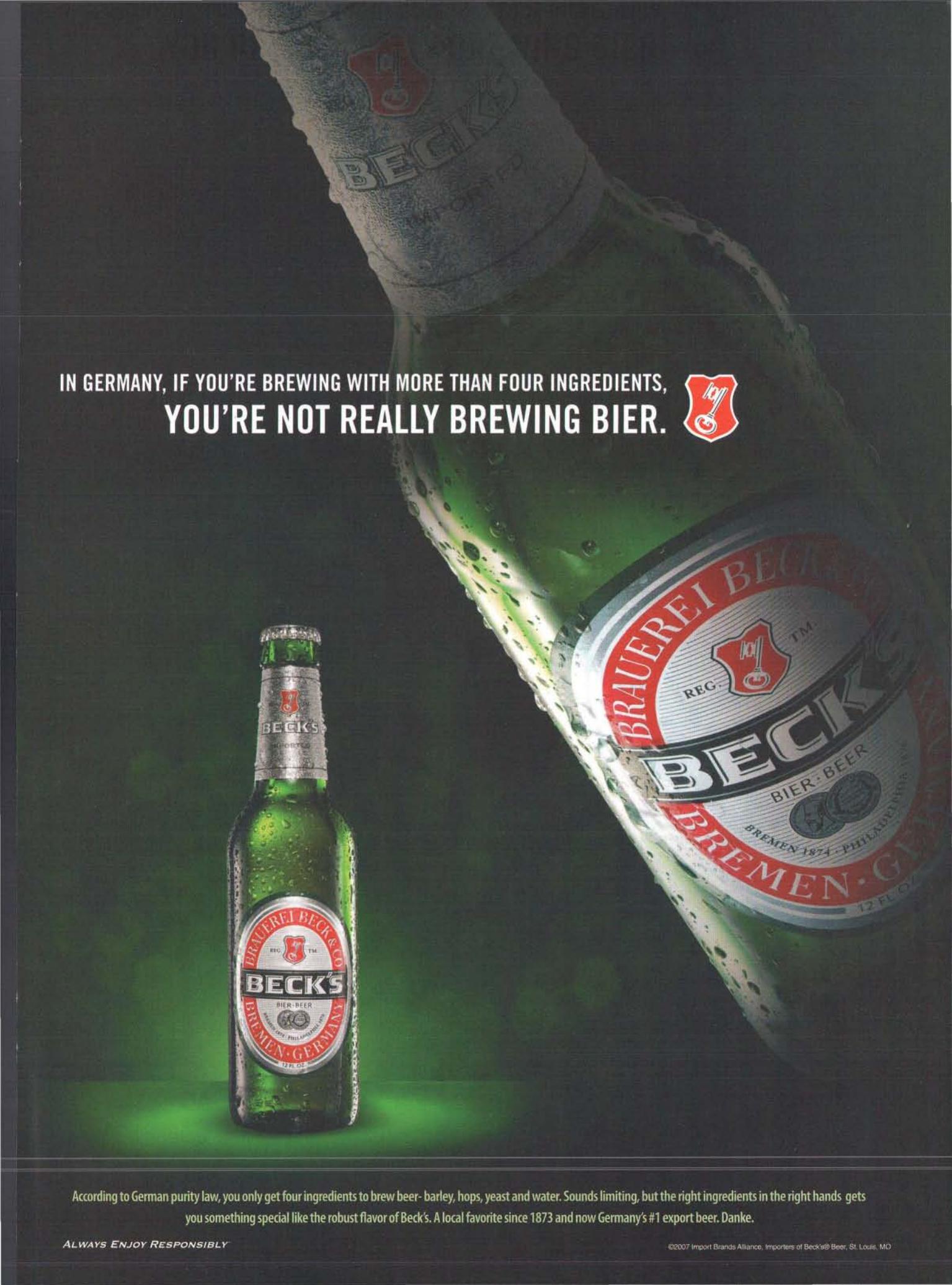
Mena Suvari stars as an unhinged nurse who mows down a homeless man (Stephen Rea) with her car, then leaves him for dead in her garage—with disastrous consequences (what else?). Stuart Gordon's jet-black comedy may be the horror maestro's finest since the 1985 gore opera, *Re-Animator*. —Chris Alexander



### DVD

#### Gattaca: Special Edition DVD

Andrew Niccol's underrated 1997 sci-fi thriller about a genetically flawed man (Ethan Hawke) among the designer elite (Uma Thurman) deserves a second look—if only to appreciate its clever avoidance of futuristic clichés. A digital upgrade lends a flawless finish. —Jennifer Hillner



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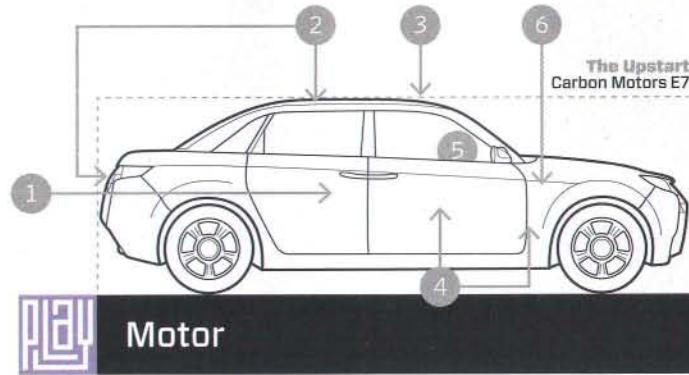


# Hot Pursuit

A new automaker has one item on its to-do list: make the perfect police car.

Firefighters, paramedics, and even postal workers all have vehicles designed for their specific needs.

Most American cops, however, hit the mean streets in modified versions of the same car that dominates US taxi fleets: the homely Ford Crown Victoria—called the Interceptor, in black and white. Now Atlanta-based Carbon Motors wants to give the fuzz a ride they can call their own. Code-named E7, it's engineered from the ground up to protect and serve those who serve and protect. With a prototype on the way, more than 300 agencies have expressed interest in adding the car to their arsenals. Be on the lookout for something new in your rearview mirror. —MATTHEW PHENIX



Motor

## Cruiser Showdown

### 1. Doors

The E7's wide-opening suicide doors (i.e., with rear-mounted hinges) in back make stowing less-than-docile perps quicker and safer.

### 2. Lights

In place of the Interceptor's old-timey roof-mounted light bar, Carbon Motors has built a UFO's worth of strobes, flashers, and spotlights right into the E7's roof and bumpers. So much for spotting cop cars in the dark by their outline, Mr. Leadfoot.

### 3. Body

Carbon's cruiser is 12 inches shorter and 6.5 inches narrower than the Interceptor, making it more maneuverable. It's also 5.9 inches taller—better for cramming bad guys into the back without banging their heads.

Bonus: You can keep your hat on, officer.

### 4. Protection

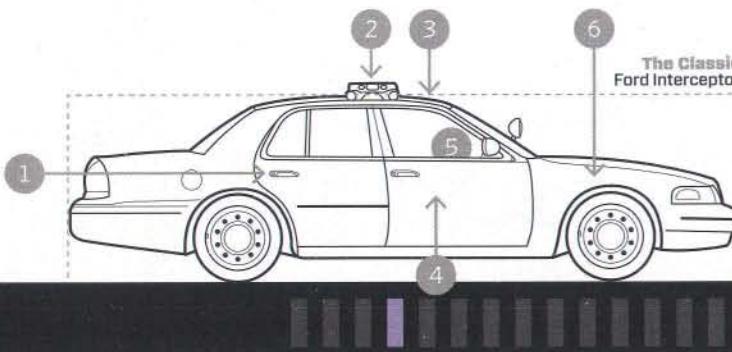
The E7 comes standard with ballistic panels in the firewall and front doors that can stop a .44-caliber round. Ford offers front-door armoring as an option. The Ford tops out at a pokey 129.

### 5. Monitor

Reed and Malloy had to twist their necks to check on suspects in the back. The E7's cockpit features an A/V feed from the rear compartment.

### 6. Engine

The upstart's six-cylinder turbodiesel uses 40 percent less fuel than the Ford's gasoline-fed V-8. Yet this 300-hp green machine hits 60 mph in 6.5 seconds (vs. the Interceptor's 8.4 secs) and can pursue suspects at 155 mph. The Ford tops out at a pokey 129.



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Do More

# Home Improvements

ASPIRING ART COLLECTORS, shred that *Starry Night* poster from the museum gift shop and hit the Web for original works by starving—and not-so-starving—artists at affordable prices. Like regular galleries, online outlets toss the daubers a cut of each sale. Taking a cue from T-shirt haven Threadless, some also let users vote on the works or submit their own. BYO bad wine and cheese cubes. —Eric Smillie



Arts



## Online Galleries for the Masses

### THUMBSTICK PRESS

Founder Tony Bailey tapped his artsy friends to seed this site, eventually pulling in new and more-established talent. Check out Jeremiah Ketner's melon-headed puppets (1) and the cheery cars and fish bursting from Alex Noriega's faded pastel *Volcano*. Or click straight through to the Girls & Tentacles page. **PRICES:** \$15 to \$45 (unframed archival prints), \$100 and up (framed).

**BEST FOR:** Blank-walled postgraduates.

**CUSTOM52** Professionals and doodlers alike submit playing-card designs; you vote them on or off the deck. Currently accepting entries for its fourth set. **PRICE:** \$13.50 per pack. **BEST FOR:** Gamblers; fledgling collectors with limited display space.

**20X200** Jen Bekman, lauded curator of emerging artists, takes her Soho gallery experience online, selling carefully selected limited-edition prints. We like the wildlife drawings by 21st-century Audubonista Carrie Marill (2).

**PRICES:** \$20 (small prints), \$200 (medium), \$2,000 (large). **BEST FOR:** Higher-rolling art patrons who want gallery quality without gallery attitude.

**BLUEFLIP ART** This community of illustrators tends toward pop surrealism—take the blinded characters of Eduardo Recife (3) or Brian Taylor's not-quite Looney Tunes. **PRICES:** \$15 to \$45 (archival giclée prints). **BEST FOR:** Refined do-gooders: 10 percent of each sale goes to a charity of the artist's choosing.



1

2

3



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# The Graphic Menace

The Cold War-era assault on comic book culture, revisited.

As gamers eagerly await the release of *Grand Theft Auto IV*—with the inevitable gale of moralistic bloat in its wake—they could do much worse than to browse a stack of pre-1955 comic books. For intense gore, inventive mayhem, and sociopathic behavior, *GTA* has nothing on EC Comics' *Crime SuspenStories* or Charles Biro's lurid *Crime Does Not Pay*, which first hit stands way back in 1942. Trashy comics were the NC-17 videogames of their day, and their suppression remains a sad chapter in US cultural history. Let's just hope Hillary Clinton's plan to rein in



videogames doesn't follow the same path.

David Hajdu retells the tale in his new book, *The Ten-Cent Plague: The Great Comic-Book Scare and How It Changed America*. By the late '40s, kids were buying 100 million comic

books every month with titles like *Pay-Off: True Crime Cases*, *It Rhymes With Lust*, and *The Crypt of Terror*. "For the first time, a whole generation felt like, 'Here's something created by other young people for me,'" Hajdu says. But McCarthyite politicians in search of new enemies, foreign and domestic, zeroed in on the corrupting influence of this cheap, unregulated entertainment.

First, there were the book burnings. In Cape Girardeau, Missouri, for example, Girl Scouts went house to house rounding up comics for the bonfire. Hajdu visited the tiny town and uncovered a cabal of former schoolboys who had secretly rescued a box of *Jungle Comics*—"all

seven deadly sins," he laughs, "swinging toward you on a vine in a leopard-skin bikini"—and hid them under a stairway. *Vive la résistance!*

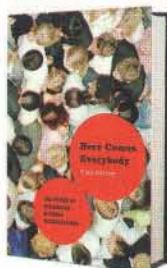
And then there were the hearings. At one televised grilling, Bill Gaines of EC Comics, hopped up on Dexedrine, made a disastrous attempt to defend the tastefulness of a comic book cover depicting a woman's severed head. The results were predictable: In 1955, after a halfhearted bid to adhere to the newly imposed Comics Code, Gaines shuttered all but one of his titles, effectively ending an era.

Turns out, censorship backfired. Gaines converted *Mad*—the one property he saved—to magazine format, exempting it from the code. "*Mad* was Gaines' mechanism for getting back at the culture that had squashed everything he loved," Hajdu says. He used it to "kick conservatism in the ass for decades." *Mad* also smuggled EC's subversive comic-book DNA into the '60s, when a new generation of artists like R. Crumb and Gilbert Shelton made the world safe for *South Park*, *Superbad*, and *GTA*. —JOSH MCHUGH



Print

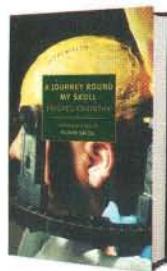
## Reviews



Here Comes Everybody

CLAY SHIRKY

If you've been sleeping through this whole Internet thing, here's a recap: Email is revolutionary, volunteers developed Linux and Wikipedia with no real oversight, and bloggers can scoop professional journalists. Those points may be obvious, but Shirky convincingly argues that online communication tools are transforming everything from airlines to the Catholic Church. And the fun's only just begun. —Eric Smillie



A Journey Round My Skull

FRIGYES KARINTHY

In 1936—before CAT scans or MRIs—Hungarian author Karinthy had his skull drilled open to remove a tumor. This unique memoir vividly details his adventure, from the first auditory hallucinations to an out-of-body experience during the operation. The book that once inspired neurologist Oliver Sacks to write is back in print for the first time since 1959, with a new introduction by Sacks. —Miyoko Ohtake

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### The new Cayenne GTS



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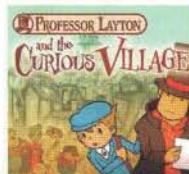
## Reviews



PLAYSTATION 3/XBOX 360

### Devil May Cry 4

Wave after wave of grotesque demons just begging to be butchered by your sword, gun, and demon-powered right arm? Yum. But you'd better RTFM: Stringing together attacks requires you to punch every button on the controller. And the uninspired camera angles and piecemeal level design make this feel like a PS2 game with a hi-def veneer. —Chris Kohler



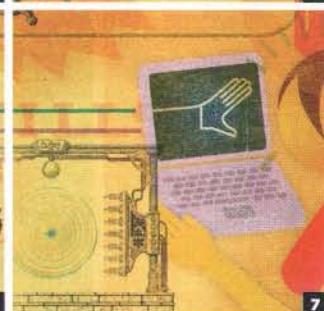
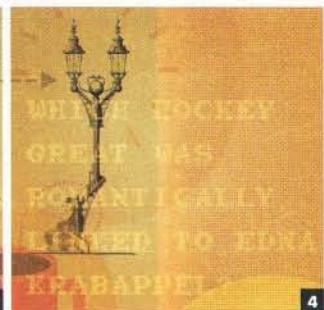
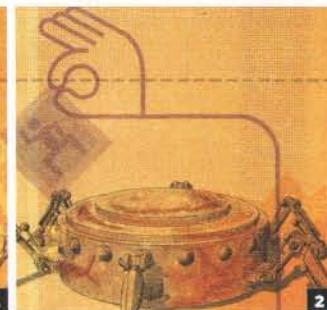
NINTENDO DS

### Professor Layton and the Curious Village

With a gorgeously animated story line and more than 100 brain-teasing logic puzzles, this is a perfect diversion for lateral thinkers. Constant "aha!" moments make you feel like a genius, and weekly challenges (downloadable via the DS's Wi-Fi function) mean the head-scratching never ends. —C.K.



## Games



## Passive Aggression

A new type of game turns Web surfing into all-out information warfare.

Can't devote 30 hours a week to *World of Warcraft*? Try racking up experience points and slaying enemies in the course of your mundane daily browsing instead. That's the thinking behind PMOGs—passively multiplayer online games. Blogfather Justin Hall came up with the concept as part of his master's thesis. Downloaded as a browser plugin, a PMOG adds an extra layer of data and interactivity to the sites you visit. "We're giving people tools to wage information and routing war online," Hall says. "A framework for them to battle and bury treasure on Web pages." Does planting booby traps or tackling missions on Web pages sound like the exact opposite of fun? Think of all those Facebookers happily trading SuperPokes. WIRED asked Hall to describe a potential PMOG experience. —MARY JANE IRWIN

#### MONDAY 9 AM

1. A user installs the PMOG applet and is awarded 200 data points and an assortment of tools for in-game use. He picks the username Web\_playa. A new layer is added to his browser's toolbar that tracks his stats and inventory as he surfs the Web.

#### WEDNESDAY 9 AM

5. Web\_playa is notified that Show\_Boat triggered the St. Nick while trying to place mines on MTV.com and lost two data points. Ah, revenge is sweet. In case Show\_Boat returns, Web\_playa installs a wall around MTV.com that will withstand several rockets.

#### 10:30 AM

2. During a coffee break, Web\_playa discovers that his friend Sarah83 posted some embarrassing pics of him on her Flickr page. To retaliate, Web\_playa tags her as a rival and sets a data mine that will blast any PMOGer who visits the page. Take that!

#### 3 PM

6. During an endless call to tech support, Web\_playa completes a few more missions, leveling up. w00t! His character's attributes are Vigilante, Destroyer, and Benefactor, allowing him to store even more mines and other gear in his arsenal.

#### 12:45 PM

3. After lunch, Web\_playa checks his MySpace page. Boom! He's leaking data points. Sarah83's ally Show\_Boat planted a mine there. Web\_playa uses a St. Nick attack, which will detect when they lay another mine and punish their naughtiness.

#### THURSDAY 1:45 PM

7. Web\_playa bargains with ally 1337netmonk to obtain portals, which forge links between Web sites. He can use them to create more missions or, say, connect fellow PMOGers who visit gadget blog Gizmodo to a cool iPhone hack he discovered.

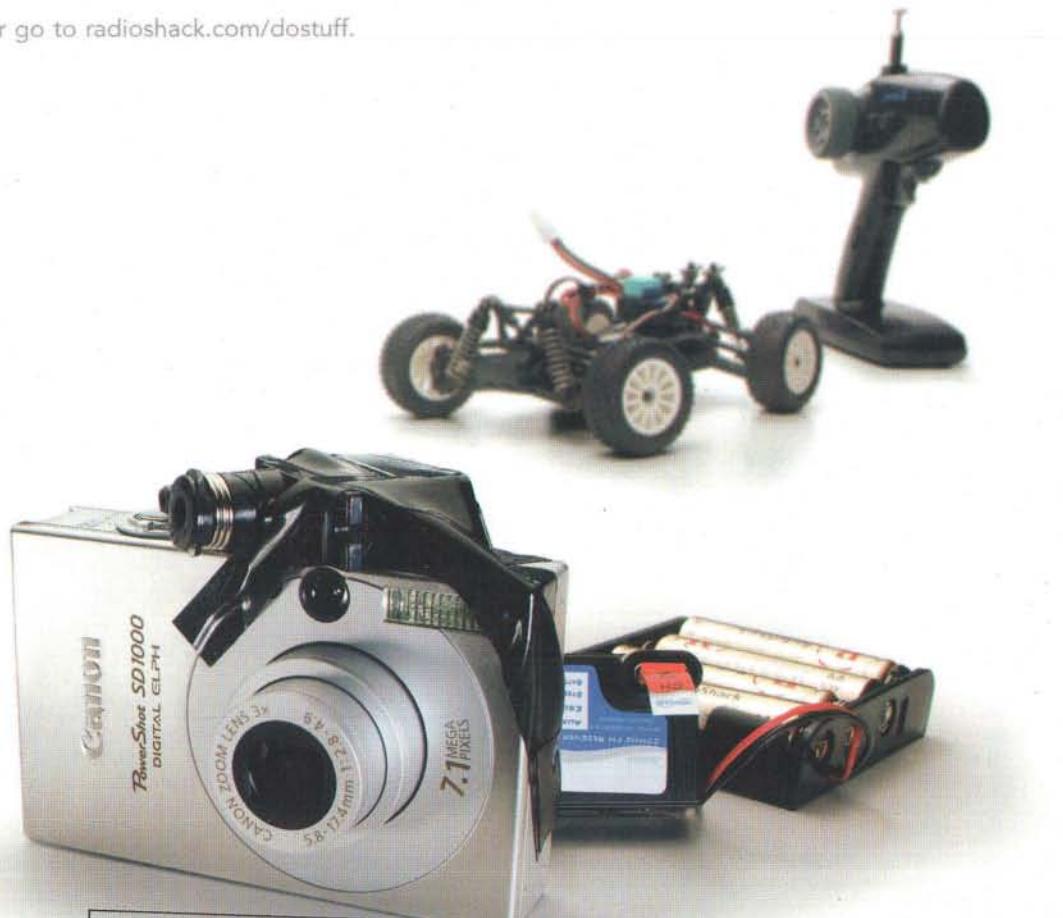
#### TUESDAY 11 AM

4. While Web\_playa is checking hockey scores on ESPN, a lamppost materializes, symbolizing a mission created by another player. A correct answer grants more data points, a badge, and tools Web\_playa can use to create his own missions.

#### FRIDAY 2 PM

8. In the middle of a dull meeting, Web\_playa designs a mission for other PMOGers—a puzzle around his favorite episode of *Arrested Development*. He places portals that will take players to obsessive fan sites and Michael Cera's IMDB page.

There's no telling what you'll do with the right products, accessories, and a little advice. Like photographing wildlife without scaring it away. This is done by rigging parts from an RC car to a camera and triggering the shot with the car's controller. See what you are shooting remotely with an AV sender and monitor. To learn how to do this yourself, stop by or go to [radioshack.com/dostuff](http://radioshack.com/dostuff).



**DEER CATCHER**      Created by: Dwayne Campbell

What I wanted to do: Take a picture of deer without scaring them away.

What I did:

Icons representing the components used: camera, remote control, tripod, memory card, and a small device.



# FLAUNT

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# Hennessy

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## Wires?! We Don't Need No Stinking Wires!

All hail the Sennheiser MX W1, the world's first truly wireless earbuds. There's no tether to your MP3 player, nothing connecting the buds to one another, and they play nice with any device sporting a standard 3.5-mm jack. Plug the matchbook-sized transmitter into, say, your iPod's headphone port, use the integrated elastic strap to fasten it to the player, and stow the bundle up to 30 feet away. The phones use a new wireless protocol called Kleer, which transmits uncompressed tunage at up to 2.37 Mbytes per second, more than enough for CD-quality audio. And don't worry about running out of juice. The earbuds' battery life is five hours, and their holster (pictured) doubles as the charger. Power up the case at home, and it will hold enough zap to treat the buds to three 15-minute quick charges. **MX W1 \$600, sennheiser.com**



Fetish | BY JOE BROWN





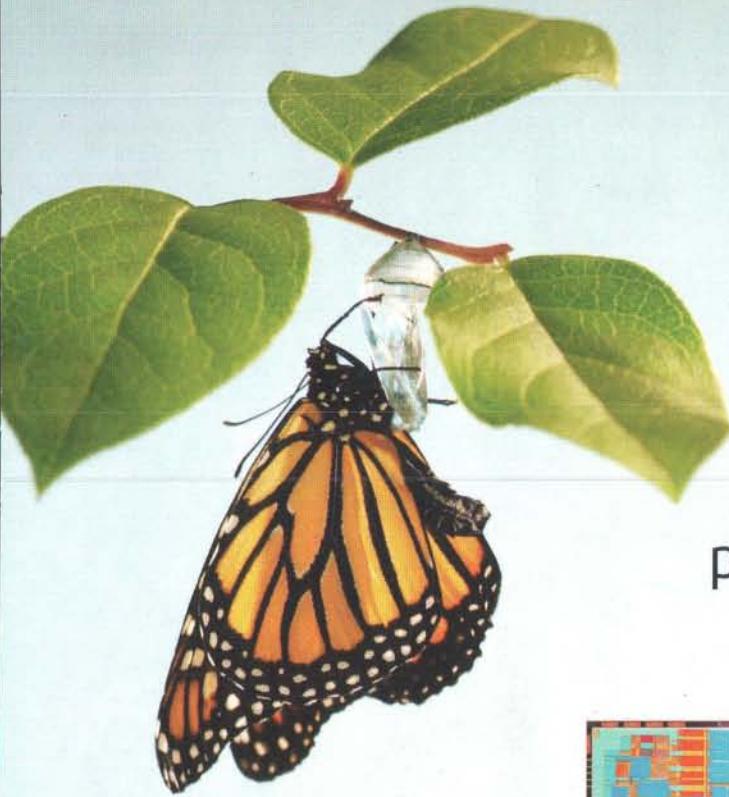
## Trail Hand

You are on the precipice of backwoods Babylon: powder untouched since the Cretaceous, the perfect run you hiked all day to get to and could never find again. If it wasn't 20 below, you'd remove your gloves, fish out your GPS, and mark the spot. But instead you avoid the frostbite and just bomb the hillside, settling for the memory. Garmin's Colorado 400t would never let this happen to you. Its click wheel interface is designed to be operated with gloves on, and the unit, which clips to your parka with an integrated carabiner, is waterproof to IPX7 standards should you tackle the slope on your face. Switch between navigation, a satellite-based compass, and a topological view that will confirm that you are, indeed, on top of the world. **Colorado 400t \$599, garmin.com**

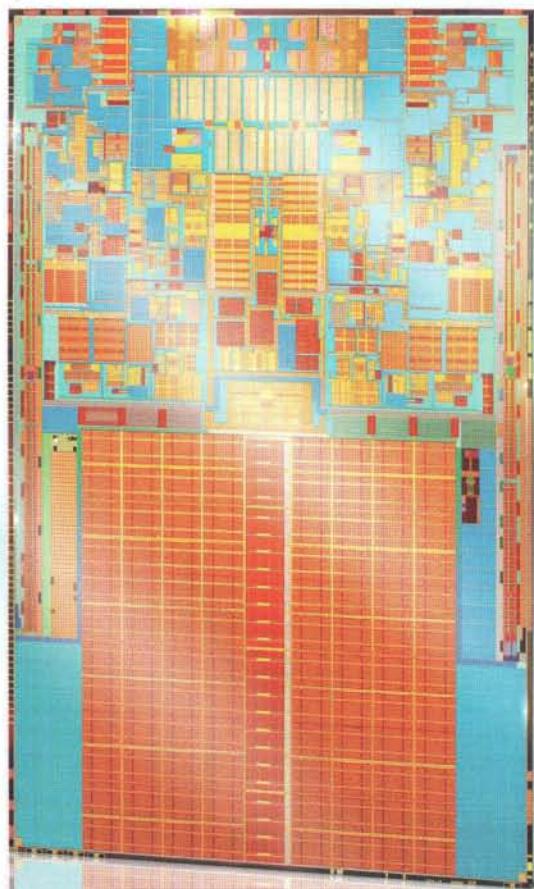


## Action Hero

Your videocam's favorite subjects are often its deadliest enemies, like a gnarly wave or a sippy cup-flinging child. Don't go through life avoiding the action. You need a camcorder with cojones, one that won't shrink from a drooling Micromagnon whose battle cry is "Truck!" Panasonic's SDR-SW20 has got your back. Or, rather, you won't need to get its back. Drop it from 4 feet up, submerge it in 5 feet of water, or film in a dust storm with no ill effects. The camera is sealed, including an SD card slot with a gasketed hatch that looks like it came off a tiny submarine. It films in YouTube-ready standard def and captures VGA stills that won't overload your blog. And, should you not want to test its mettle, the 10X optical zoom lets you stay onshore—or far from the high chair. **SDR-SW20 \$400, panasonic.com**



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## Power Player

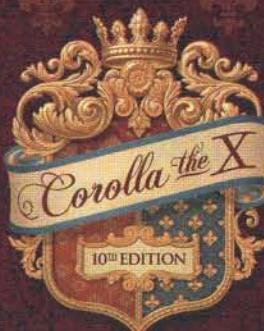
Even when your 50-inch plasma is dark, it's still sucking electricity. That's because it's not off. It's never really off. It's in standby mode, keeping the pixels warmed up to let it turn on faster. Same goes for your phone charger, your stereo, and so on: Electronics are vampires, bleeding you dry. You could run around unplugging them all whenever you leave the house, or you could pick up the Belkin Conserve, a power strip with an RF remote control that cuts the power to six of its eight outlets. Of course, some things always need to be on—like your DVR. So the Conserve has two plugs with constant power. Because even though the writers' strike means there hasn't been a new *30 Rock* for months, you do need your fix. **Conserve \$50, [belkin.com](http://belkin.com)**





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# Entertainment Unleashed

## Apple iPod touch

\$299 (8 GB), \$399 (16 GB) • [apple.com](http://apple.com)

Essentially an iPhone sans phone, this gadget's touchscreen interface makes all other human-device interactions seem grotesque. Movies look fantastic on the 3.5-inch, 480 x 320-pixel widescreen, and we managed to coax one more hour of video from the player than Apple's five-hour estimate. Wi-Fi support for hot spot access to the iTunes store, YouTube videos, and Web browsing make the touch all the more enticing for those who haven't succumbed to its AT&T-exclusive big brother.

**WIRED** Thin, elegant design—slightly smaller than an iPhone. Ambient light sensor adjusts display brightness to save battery.

**Tired** Omission of phone-centric features—camera, external speakers—is OK, but the lack of media player-appropriate Bluetooth support is not. No external volume control. Pricey for capacity.



## Archos 705 WiFi

\$400 (80 GB), \$500 (160 GB) • [archos.com](http://archos.com)

The massive 7-inch touchscreen on the Archos makes it far less portable than the competition, unless cargo pants are a fixture of your wardrobe. But if you're ready to lug this monster, you'll love both its big-screen benefits and the deftly implemented wireless access.

**WIRED** Up to 160 gigs of storage will hold everything you own. Supports DivX and XviD codecs natively, with plug-ins for H.264 (\$20) and DVD-native MPEG-2 support (\$20). Optional DVR docking station (\$100) combined with media streaming turns the 705 WiFi into a portable AppleTV/TiVo.

**Tired** Weak three and a half hours of video playback. 260,000-color screen yields noticeably lower contrast than other players. Cost of plug-ins and accessories adds up quickly. Speakers not very loud.



Sick of your music? With these players, you can surf the Web and grab new content anywhere there's a wireless hot spot. —CARLOS BERGFELD



Test | WI-FI PORTABLE MEDIA PLAYERS



## Cowon Q5W

\$550 (40 GB), \$600 (60 GB) • [cowonamerica.com](http://cowonamerica.com)

With a Windows CE operating system, an AMD 600-MHz processor, and Wi-Fi Web browsing, Cowon's newest media player seems more like an Ultra Mobile PC. The unit's gorgeous 5-inch, 800 x 480 LCD touchscreen and built-in DivX and XviD codec support make watching flicks on the go the Q5W's forte.

But the rest of the player's functions are hampered by a slapdash user interface—it actually runs as a program on top of the Windows CE interface. Even though the Q5W supports Flash-based Web browsing, surfing duties are relegated to Windows CE's YouTube-incompatible Internet Explorer. Arrgh!

**WIRED** Terrific audio quality and video playback. Crazy format support: DivX, XviD, MPEG-4, and WMV 7/8/9 video, as well as Ogg Vorbis, FLAC, and Monkey's Audio sound files. MSN Messenger and Flash-supported Web browsing over Wi-Fi.

**Tired** Poor UI coupled with Windows CE 5.0 makes it feel like a shoddy home-brewed device. Horrid file tree for navigating the music library.



## Haier ibiza Rhapsody

\$299 (30 GB) • [haieramerica.com](http://haieramerica.com)

The ibiza's iPod classic-knockoff aesthetics hide one of the most innovative attempts at a media player in years. Paired with a Rhapsody To Go music subscription (\$15 per month), the Linux-based player lets you access Rhapsody's full content library from any Wi-Fi hot spot. You can stream or download whole albums, listen to Internet radio, and find similar artists with ease. But unfortunately, Wi-Fi use also saps the battery in a few hours.

**WIRED** Touchpad controls work well with slickly designed interface. Podcast access and minimalist Web surfing. Bluetooth headphone support. Firmware upgrades download automatically to device.

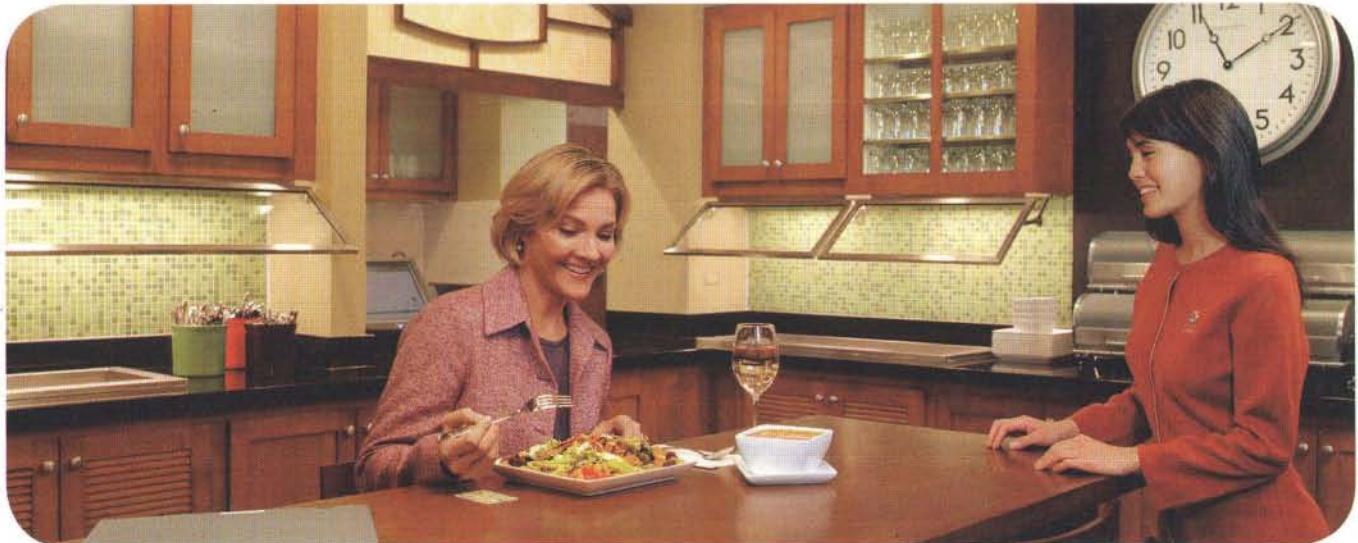
**Tired** Extremely scary cycle of repeated system crashes occurred after a player lockup. Tiny 2.5-inch screen and paltry battery life for video playback—less than three hours. Most videos need conversion, with no support for DivX or XviD and very specific format requirements. Mac users need not apply.



66

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FROM THE GADGET LAB

## Dell UltraSharp 3008WFP 30-Inch

\$1,999 • dell.com



This display rocks a ton of standards (VGA, DVI-D, S-video, composite, component, and HDMI) and even includes the newfangled DisplayPort input for the early-adopter crowd. Besides sporting a dedicated image processor, the 3008WFP can display up to 117 percent of the NTSC color gamut. That's right—Dell's wunderkind gives you colors beyond the industry standard. The flimsy five-button interface for accessing the onscreen menus and the wallet-busting price tag are vexing. But those are just minor quibbles. The 3008WFP is nothing but net. —Terrence Russell



Test



## Crema the Crop

Become your own barista. These espresso machines can make anything from a plain cuppa joe to a fancy-pants latte. The best models grind, tamp, brew, and froth with a flick of a switch, but others will just leave a bitter taste in your mouth. —NEIL GELLER



### Nespresso Lattissima

\$799 • nespresso.com

Limited cash and counter space? Consider this machine. It uses proprietary pods instead of fresh-ground beans to produce its coffee. We tried out ours at a dinner party, and guests came away impressed with how easy it was to pop in a pod, select a beverage, and watch it pour a succulent espresso drink. What they didn't appreciate was the dearth of options.

**WIRED** Excessively delicious coffee at a fair price. Compact, minimalist design. Single-button press washes milk container. Easy cleanup: Pods mean no messy coffee grounds.

**TIRED** 49-cent pods available only through Nespresso or Bloomingdale's. Few drink selections: Hardcore coffee enthusiasts might find the pod choices too limiting. Espresso shot? Not so hot.

### Jura Capresso Impressa Z6

\$3,659 • capresso.com

Hate getting up in the morning? That will change with the Z6. Brewing coffee is fairly simple and yields powerful, tasty cups. Espresso-based drinks are a cinch to produce, too—but often taste slightly watered-down. The best part, though, is the grinder, which is quiet enough to run on full power without waking the whole house.

**WIRED** Milk container keeps liquid cold for up to eight hours on the countertop, then removes easily to be stored in the fridge. Simple to program. Simple to use. Simple to clean up. Produces tasty crema and really foamy cappuccino.

**TIRIED** You'll need hands faster than a three-card monte dealer to shuffle cups before each espresso shot. Shallow drip tray hard to wash. No warning for low milk. Poor cup warmer.

### De'Longhi Magnifica ESAM3500.N

\$1,500 • delonghi-espresso.com

You're really, really hungover and need a powerful triple espresso to get through the day. But that journey to the coffee shop is just so harsh. Here's where the Magnifica comes in. This elegant machine is by far the easiest of the bunch to use. The fact that it yields delicious espresso-based drinks is just foam. Milk dispensing and cleaning systems are also outstanding. But regular drip coffee? Even with some of the best grinds, the flavor wasn't much better than Taster's Choice.

**WIRED** Superb cup warmer. Large-capacity milk container cleans up nicely at the touch of a button. Good value.

**TIRIED** Must remove milk canister to access water tank. Grinder loud enough to wake the dead. Few drink presets. Bean hopper awkward to refill.

### Saeco Primea Cappuccino Touch Plus

\$2,900 • www.saeco-primea.com

Excess plastic makes this machine look cheap—surprising for the price. Materials aside, it's infused with a ton of tech. The touchscreen features programmable menus, which allow you to create exciting new drinks by tweaking the ratios of coffee, milk, and water. Coffee and simple espresso drinks are delicious slam dunks of flavor, but anything more complicated needs a lot of attention.

**WIRED** User interface not at all confusing. Good crema and hands down best espresso shot. Generous variety of preset coffee drinks for the more serious connoisseur. Front dial quickly adjusts coffee strength.

**TIRIED** Often screws up fancy drinks. Milk frequently clogs in machine, requiring constant flushing.





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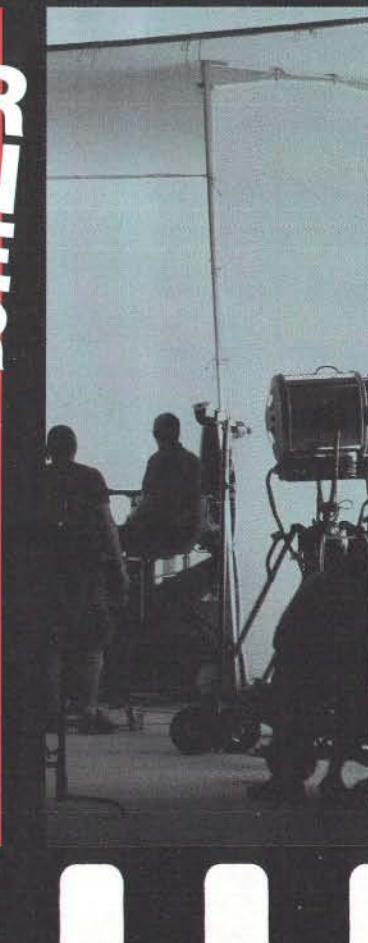
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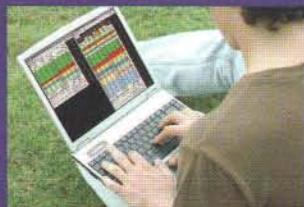


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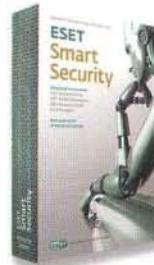
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FROM THE GADGET LAB

## Oakley Split Thump

\$299 • [oakley.com](http://oakley.com)

In the latest version of Oakley's sunglasses-cum-MP3-player, you can detach the earbuds and hide the buttons—so when you're not playing tracks, they look like regular shades. Snap the buds back into place and you've got a great sports-oriented MP3 player with a gig of storage. On a break-neck cycling descent from the top of Griffith Park in Los Angeles, my eyes never watered. Meanwhile, the all-in-one design keeps you from getting tangled up in cords when you're running or, say, doing parkour jumps downtown.

—Mathew Honan



## Gadget Lab

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PLAY

Test

# And Laptops For All

You don't have to take out a second mortgage to afford that new notebook. Some pint-sized portables cost less than 400 bucks and provide surprisingly full-size power. —CHRISTOPHER NULL

### Asus Eee PC

\$399 • [eepc.asus.com](http://eepc.asus.com)

At 2 pounds even, the Asus Eee PC is the lightest ultracheap PC on the market and also one of the most capable. Running a simplified version of Xandros Linux, jumbo icons let you launch a Web browser, Skype, and office apps. Linux n00bs won't have any trouble setting up wireless networks, managing files, or snapping pics on the integrated webcam. But the Eee's diminutive allure also works against it: The keyboard is too small for touch-typing, and the tiny 7-inch screen can't display much info.

**WIRED** Available in multiple colors. Serious hackers can go nuts adding extra apps and even Windows. 4-GB solid-state drive protects data against notebook drops.

**TIRED** Two hours and 20 minutes of battery life disappoints. Only 1.3 GB of free storage space out of the box. Mouse buttons are small, stiff.

### Intel Classmate PC

\$300 • [intel.com](http://intel.com)

Unlike its low-end competition, Intel's entry into the starter PC market has a secret weapon: It runs Windows (XP, to be exact). Apps loaded relatively quickly (even Microsoft Office, which came loaded on our machine), and full-screen video and Flash clips didn't stutter. Of course, it's still a model that's designed for kids in a classroom environment: The miniature keyboard won't do ham-fisted grown-ups any favors.

**WIRED** Runs Windows XP, allowing for easy app expansion and sharing with other PCs at home or at school. Very rugged. Almost as cute as the OLPC XO. Exceptional battery life of three hours, 40 minutes.

**TIRED** Comparatively loud and hot. Tinny speakers. Not nearly enough storage space (just half a gig available to the user). Another minuscule 7-inch screen.

### Zonbu Notebook

\$279 (plus \$14.95 per month) • [zonbu.com](http://zonbu.com)

For many, the value proposition will be enticing: You pay a paltry \$279 up front for a spacious, 15.4-inch laptop, then \$14.95 a month for the next two years. (Alternately, you pay \$479 for the notebook, without the service.) The laptop runs a version of Gentoo Linux, preloaded with the usual frills: OpenOffice, Firefox, and Skype. Unfortunately, the large size and familiar form may lull you into thinking the Zonbu has more power than it does.

**WIRED** Subscription includes 50 GB of online storage and automatic backup. Units sold under subscription plan are replaced for free if they break. Incredibly bright LCD. Decent keyboard.

**TIRED** Sluggish performance and jumpy video quality. \$638 over two years may not be such a fantastic bargain.

### OLPC XO

\$188 • [laptop.org](http://laptop.org)

OLPC = One Laptop Per Child. The XO is designed with students in mind: The keyboard, wrapped in a rubberized membrane, is built for tiny, food-encrusted fingers. Once you open the device you'll find yourself confronted with 11 unfamiliar buttons, which must be puzzled out through trial and error.

**WIRED** Insanely rugged. Can operate in extreme temperatures and even in standing water. Loaded with kid-friendly apps, including novel music-making programs. Display can be used outdoors and swivels into tablet mode.

**TIRED** For those accustomed to standard laptops, the XO can be baffling: OLPC president Walter Bender was in the middle of writing an FAQ on how to open the lid when we spoke to him. Keys are far too tiny for frequent use. Overly sensitive touchpad.



Scott Brown

# What Ever Happened to Baby Scott?

**"Paris Power Ballad" was my viral ticket to stardom. But now I'm just a flea on the long tail of celebrity.**

**ello, America.** Remember me? For a few glorious days last summer, I was the toast of the blogosphere, a viral-video celebrity on par with that incredibly dramatic prairie dog. Perhaps you recall (or wouldn't mind Googling—go on, I'll wait) a certain hair-metal power ballad, with lyrics by Paris Hilton.

Yeah, I did that. I did it at the urging of a colleague who (a) pointed out the uncanny convergence of Hilton's jailhouse poetry and '80s hair-metal lyrical excess, and (b) predicted easy, greasy Net fame if I could write a crappy song in 12 hours. (Hilton, fresh from the slammer, had just recited these moving

words on *Larry King Live*: "They say when we reach a crossroads / Or a turning point in life / It doesn't really matter how we got there"—the "Ev'ry Rose Has Its Thorn" of our great age.) I cranked out the tune, a videographer friend handled the visuals, and we uploaded it to *funnyordie.com*. The ditty spread like drug-resistant staph. I won't bore you with the impressive reticulations of my linkage, but suffice it to say "Paris Power Ballad" made the pop-blog equivalent of a full Ginsburg. Meanwhile, my pageview tally steadily climbed to more than 300,000—a healthy chunk of those racked up in the first 72 hours.

Flabbergasted friends in "old media" called with congrats and predictions of "a deal," perhaps even "deals," though no one could say what said deals would consist of. Nonetheless, they advised me to purchase a URL and brace for incoming traffic: For while Net fame is the most disposable, its onset is also the fastest, and I could be a thousandaire by dawn. I'll admit it went to my head, this possible promise of potentially actual virtual fame. Much like Paris, I'd begun my "journey" on a whim: Why not throw a little wit at the wall and see if it sticks? At the very least, my hated Google rivals—DJ Scott Brown, English footballer Scott Brown, Scottish footballer Scott Brown, the other English footballer Scott Brown, Massachusetts state senator Scott Brown, and the loathsome Philadelphia architecture firm Venturi, Scott Brown and Associates—would cower beneath my top-ranked search results. Someone might finally write me a friggin' Wiki. Thus, with these modest expectations, did I spread-eagle myself on the crowdsourced casting couch of Net meritocracy. Piggybacked on Paris Hilton, a person

famously famous for nothing, I had a chance to become famous for even less.

So, you wonder: Where am I now?

I'm the same grounded, bitter journeyman writer I was before my brush with cewebrity. There were no deals. The world did not beat a path to my WordPress blog. Venturi Scott Brown still eats my lunch, Google-wise. Where did I go wrong? Frankly, I was trying too hard, yet not hard enough. For one, I didn't appear in my own video, making it harder to franchise myself. And my muse may have overshadowed me: The comments amounted to variations on the theme "Paris is such a ho imho." And yes, I settled for an of-the-moment cheap shot instead of creating a line of durable, creative, and genuinely funny sketches along the lines of *Human Giant* or the *Whitest Kids U Know*, comedy troupes that've nabbed TV deals based on homemade Web videos.

But those guys are pros. I was striving for accidental celebrity, à la the "Leave Britney Alone" guy or Brooke "Brookers" Brodack—both of whom nabbed the type of deals I'd been denied. These are the real Web celebs: found objects snapped up by agents and producers on the cheap as affordable insurance against the approaching new media storm. Couldn't I at least be one of those?

Nope. To carve out a niche, I would've needed to churn out several more celebrity-foible-themed songs. What's more, I'd forgotten the supply-side mechanics of Web fame: More of us can become famous for less, but there's also less fame divvied up among more of us. Apologies to the president, but this pie isn't getting higher. The culture's entertainment metabolism has just sped up; whole careers run their course in a matter of hours. (Meanwhile, the big-screen gods can drop in and upend the small-screen game whenever they wish. As I struggled in the *funnyordie.com* pit, Will Ferrell and his ubiquitous "Landlord" video sat atop the heap.)

Ah, well. "Paris Power Ballad" still outpolls "Kucinich Sings 'Sixteen Tons.'" Nothing to blog home about, but it's something. And FWIW, it's still out there. I even invite you to lip-synch it. C'mon! I'll make ya famous.

EMAIL [scott\\_brown@wired.com](mailto:scott_brown@wired.com)





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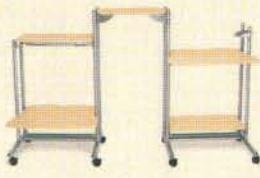
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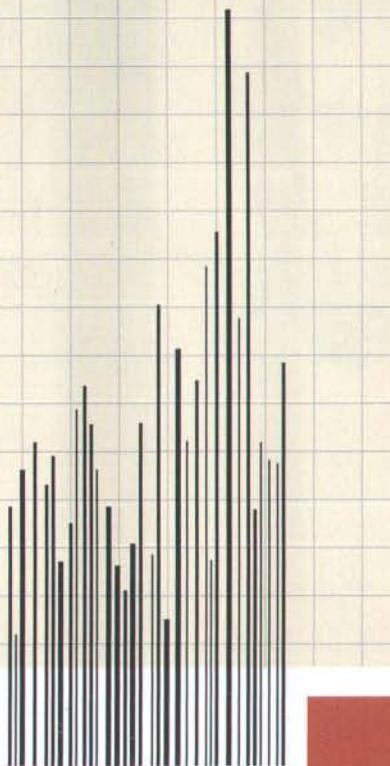


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# The Netflix Challenge

A \$1 million prize for building a better recommendation engine is attracting the biggest math brains around. Then there's the psychologist who just might win it all.

BY JORDAN ELLENBERG



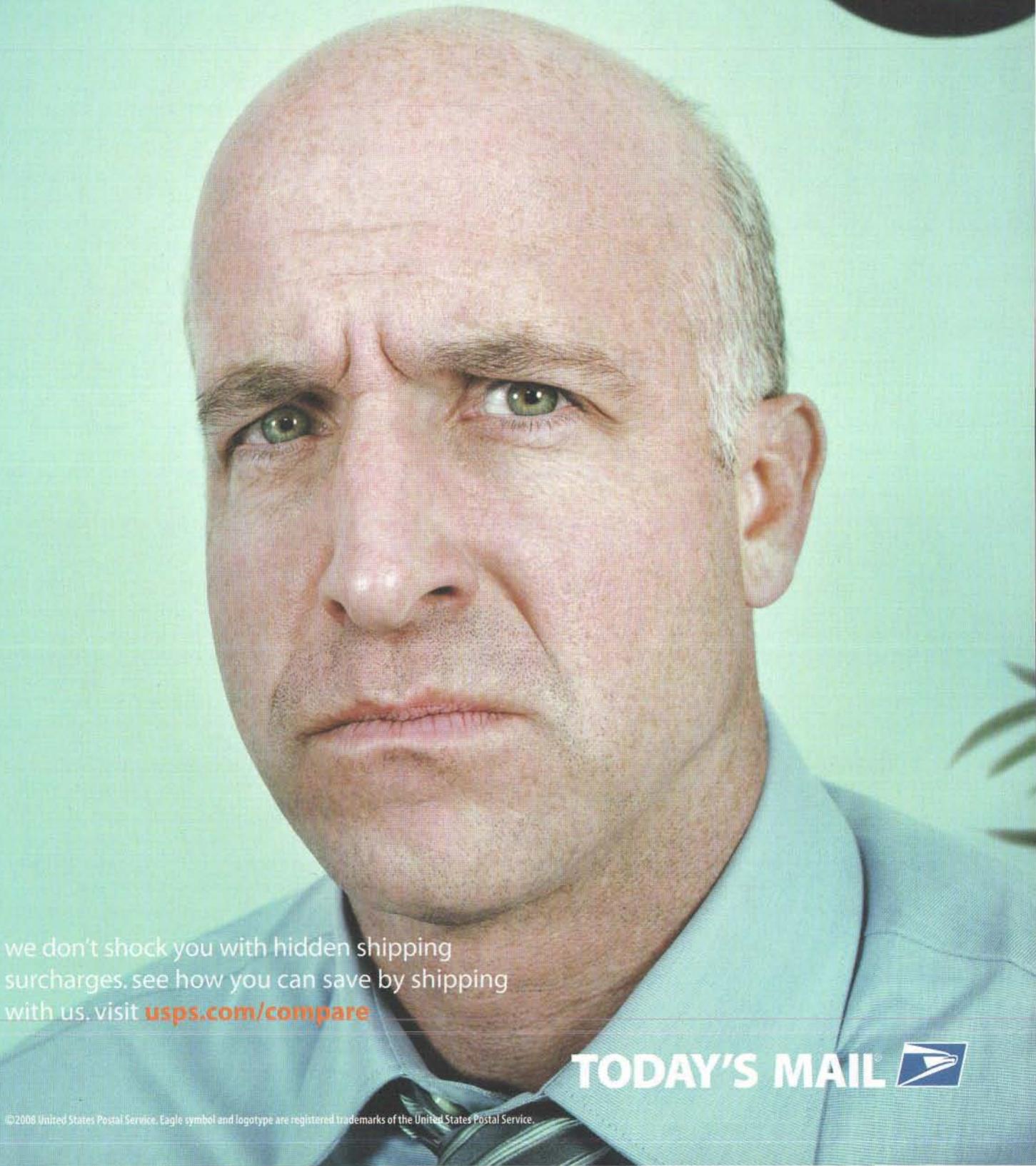
**At first, it seemed** some geeked-out super-coder was going to make an easy million.

In October 2006, Netflix announced it would give a cool seven figures to whoever created a movie-recommending algorithm 10 percent better than its own. Within two weeks, the DVD rental company had received 169 submissions, including three that were slightly superior to Cinematch, Netflix's recommendation software. After a month, more than a thousand programs had been entered, and the top scorers were almost halfway to the goal.

But what started out looking simple suddenly got hard. The rate of improvement began to slow. The same three or four teams clogged the top of the leaderboard, inching forward decimal by agonizing decimal. There was BellKor, a research group from AT&T. There was Dinosaur Planet, a team of Princeton alums. And there were others from the usual math powerhouses—like the University of Toronto. After a year, AT&T's team was in first place, but its engine was only 8.43 percent better than Cinematch.

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Netflix Prize seeker Gavin Potter in his London home with his math consultant (and daughter) Emily.

Progress was almost imperceptible, and people began to say a 10 percent improvement might not be possible.

Then, in November 2007, a new entrant suddenly appeared in the top 10: a mystery competitor who went by the name "Just a guy in a garage." His first entry was 7.15 percent better than Cinematch; BellKor had taken seven months to achieve the same score. On December 20, he passed the team from the University of Toronto. On January 9, with a score 8.00 percent higher than Cinematch, he passed Dinosaur Planet.

Secrecy hasn't been a big part of the Netflix competition. The prize hunters, even the leaders, are startlingly open about the methods they're using, acting more like academics huddled over a knotty problem than entrepreneurs jostling for a \$1 million payday. In December 2006, a competitor called "simonfunk" posted a complete description of his algorithm—which at the time was tied for third place—giving everyone else the opportunity to piggyback on his progress. "We had no idea the extent to which people would collaborate with each other," says Jim Bennett, vice president for recommendation systems at Netflix. When I ask Yehuda Koren, BellKor's leader, whether the prize money would go to him

and his teammates or to AT&T, he pauses. He seems honestly to have never considered the question. "We got a big prize by learning and interacting with other teams," he says. "This is the real prize for us."

"Just a guy in a garage" was the exception to all this openness. He didn't even have a link attached to his screen name, which kept creeping higher and higher on the leaderboard. By mid-January, there were just five teams, out of 25,000 entrants, ahead of him. And still, no one knew who he was or by what statistical magic he kept improving. "He's very mysterious," says Koren with un concealed interest. "I hope you will at least be able to find out his name."

**His name is Gavin Potter.** He's a 48-year-old Englishman, a retired management consultant with an undergraduate degree in psychology and a master's in operations research. He has worked for Shell, Price waterhouseCoopers, and IBM. In 2006, he left his job at IBM to explore the idea of starting a PhD in machine learning, a field in which he has no formal training. When he read about the Netflix Prize, he decided to give it a shot—what better way to find out just how serious about the topic he really was?

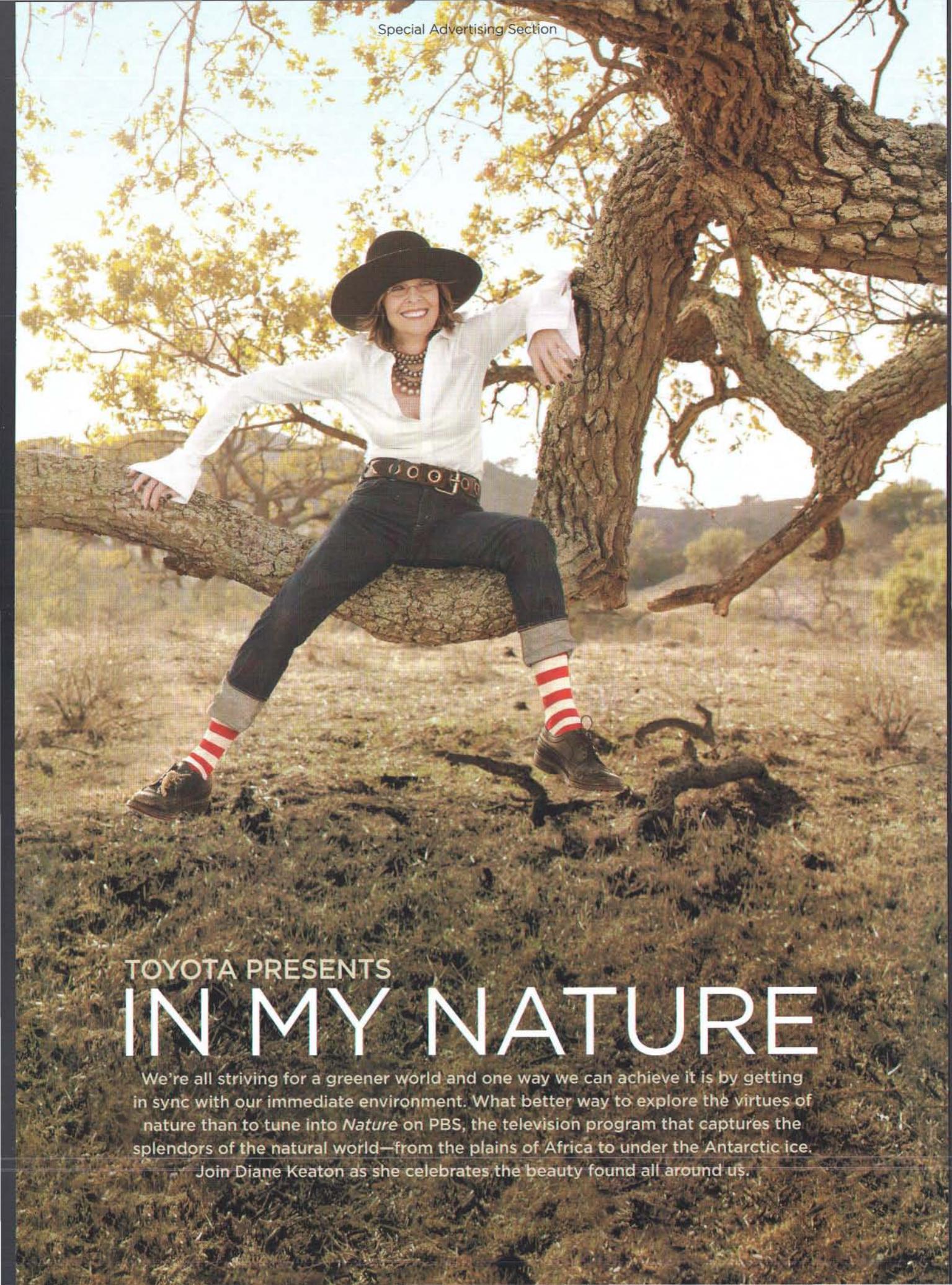
In 2001, Potter cowrote a book called *Business in a Virtual World*

that described how companies could best take advantage of new technology. So he's well aware of the commercial value of improving recommender systems, which tend to perform poorly, sometimes comically so. (You liked *The Squid and the Whale*? Try this Jacques Cousteau documentary.) "The 20th century was about sorting out supply," Potter says. "The 21st is going to be about sorting out demand." The Internet makes everything available, but mere availability is meaningless if the products remain unknown to potential buyers.

Potter says his anonymity is mostly accidental. He started that way and didn't come out into the open until after WIRED found him. "I guess I didn't think it was worth putting up a link until I had got somewhere," he says, adding that he'd been seriously posting under the name of his venture capital and consulting firm, Mathematical Capital, for two months before launching "Just a guy." When he started competing, he posted to his blog: "Decided to take the Netflix Prize seriously. Looks kind of fun. Not sure where I will get to as I am not an academic or a mathematician. However, being an unemployed psychologist I do have a bit of time."

Oh, and he's not really in a garage: He works in a back bedroom on the second floor of his home in a quiet Central London neighborhood. The room is painted a cheery bright green and his children's toy boxes line the walls. His hardware rack is what he calls an "elderly" Dell desktop, recently refitted with 6 gigs of RAM to speed things up a bit. He doesn't run any experiments overnight; the rattling of the fan keeps his family awake.

Next to Potter's computer there's a sheet of notebook paper. On it is an intricate computation in a neat, squarish hand. Not his—the calculation was done by his oldest daughter, Emily, a high school senior who plans to start a degree at Oxford next fall. She is, for the moment, serving as her father's higher-math consultant. "He gives me bits of calculus to do," she says, in a manner that suggests she feels ready to assume a position of greater responsibility on the project. (Emily has



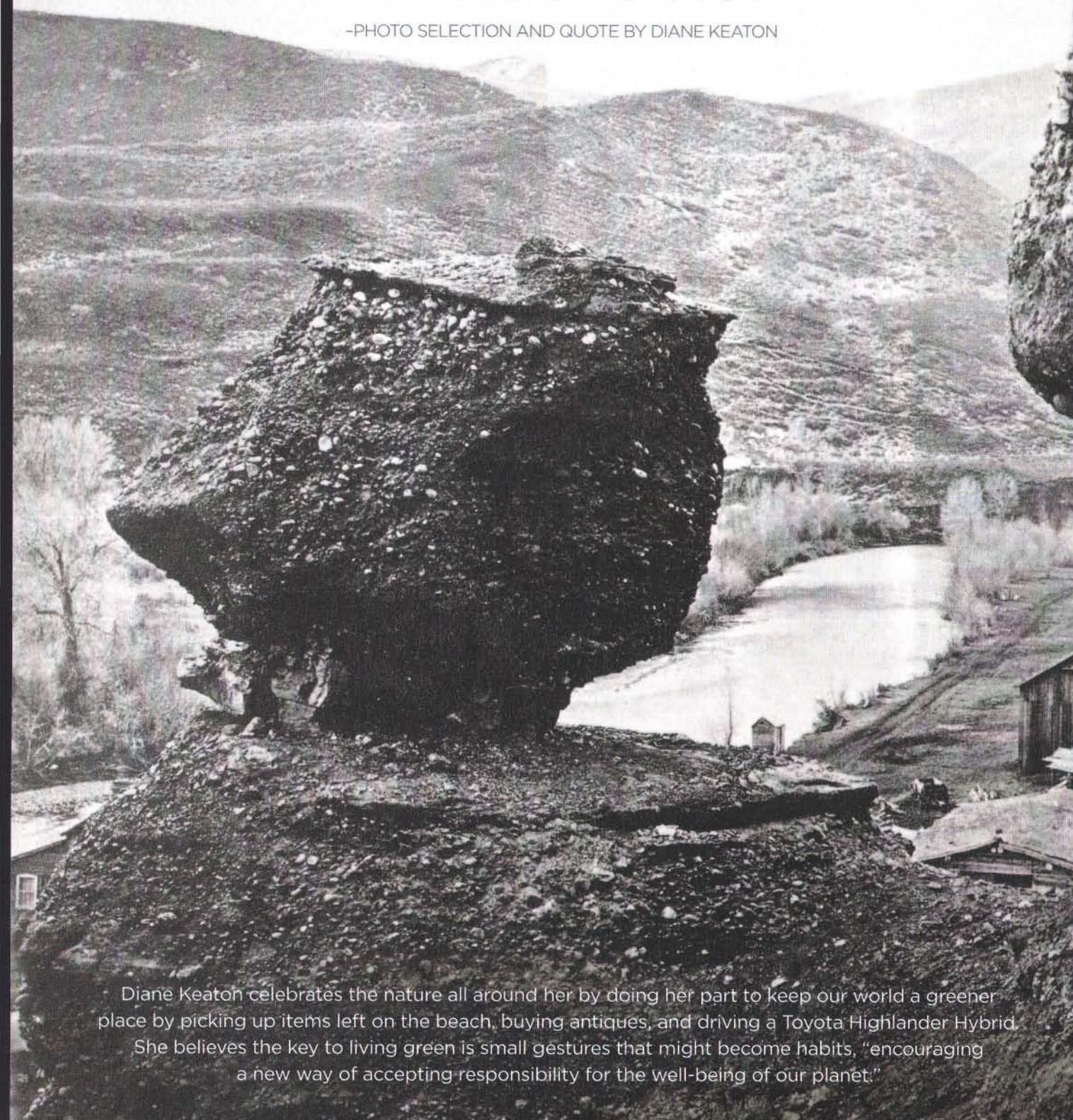
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Diane Keaton celebrates the nature all around her by doing her part to keep our world a greener place by picking up items left on the beach, buying antiques, and driving a Toyota Highlander Hybrid. She believes the key to living green is small gestures that might become habits, “encouraging a new way of accepting responsibility for the well-being of our planet.”



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## AN INTERVIEW WITH FRED KAUFMAN, *NATURE* EXECUTIVE PRODUCER

Q: How would you describe your style as an executive producer?

A: One of the joys of this job is I choose the kind of films I not only think work, but that I like. I'm an emotional filmmaker and I enjoy and appreciate films that have that kind of impact. Natural history can easily come across as cold, scientific fact. I look for shows that will touch people emotionally so that once it's over they're going to think about it.

Q: What is your favorite animal?

A: The elephant. It can eat hundreds of pounds of food a day and not feel guilty about it.

Q: What are you especially excited about from the new season?

A: This April we will show a two-part special on sex called "What Females Want and Males Will Do," a fascinating look at what animals will do to attract a mate. And in the wild, as in our human society, it's a female choice. Females look for strong, good-looking, healthy males. Sounds familiar, doesn't it? And males fight, deceive,

and sacrifice their lives to mate and pass along their genes. If you've ever been to a singles bar, you'll realize we haven't evolved very far from animals.

Q: What do you hope viewers will take away after watching *Nature*?

A: Viewing the show can be a personal and individual experience. We hope our audience comes away with a sense of respect and appreciation for the natural world. We don't own nature and we certainly can't control it. It's something we need to understand, respect, appreciate, and pass that sentiment along to our children.



received no authoritative word as to what portion of any prize money would accrue to her personal accounts.)

Potter has had to work hard to understand and implement the complex mathematics that most contestants use. But he's no stranger to computers—as a young man he built an Ohio Scientific Superboard home computer from a kit and wrote software to predict the outcome of Premier League football matches. Anyway, his strategy isn't to out-math the mathematicians. He wants to exploit something they're leaving untapped: human psychology.

fix tests the algorithms on a different ratings data set, which they've kept secret. Top scores are then posted on a leaderboard.

The benchmark Netflix uses for the contest is called root mean square error, or RMSE. Essentially, this measures the typical amount by which a prediction misses the actual score. When the competition began, Cinematch had an RMSE of 0.9525, which means that its predictions are typically off by about one point from users' actual ratings. That's not very impressive on a five-point scale: Cinematch might think you're likely to rate a movie a 4, but you might rank

Netflix a chorus of goodwill from computer scientists, who have, in turn, been happy to provide Netflix with free labor. "It's up to them to innovate now," Bennett says. "We're just the enablers." The Netflix team didn't publicize the strategies that were on the to-do lists of its own researchers—but one by one they were rediscovered, implemented, and evaluated by contestants. Netflix's programmers watched the leaderboard and read the forum obsessively. Various people had various bets on specific teams, Bennett says. "They all turned out to be wrong! But we didn't mind."

Since the prize has been such a success, might Netflix use the same model to solve other problems? I ask Bennett if there are more contests on the way. He pauses for a moment, thinking about what he wants to tell me. "One at a time," he says finally.

## A tiny reduction in the percentage of insultingly stupid movie recommendations means a lot fewer angry Netflix users.

**Netflix headquarters** is a faux-Tuscan palazzo on the edge of Silicon Valley. The three-story building overlooks Interstate 280 in Los Gatos and shares a parking lot with an apartment complex from which it is architecturally indistinguishable. The interior is done up in brushed steel and decorated with tastefully arranged orchids. It looks like the entryway of a pan-Asian restaurant.

Founded in 1997, the company has more than 7 million subscribers, who have the option to rate movies on a scale of 1 to 5. In 2000, to encourage users to keep their subscriptions active, Netflix rolled out Cinematch, which used those ratings to help customers find new movies they'd like. When a user logs in, the service suggests "Movies You'll Love"—a list of films that the algorithm guesses will get a high rating from that particular user.

In March 2006, hoping to accelerate progress on Cinematch, the company decided to crowdsource the algorithm. Netflix constructed a data set of 100 million of the ratings customers had previously supplied and made it available to any coder who wanted a crack at it. The programmers use the data to write algorithms that predict how well users will like movies they haven't yet rated. Net-

it a 3 or a 5. To win the million, a team will have to make predictions accurate enough to lower that RMSE to 0.8572.

How much difference could that possibly make? A lot, Bennett says. Netflix offers hundreds of millions of predictions a day, so a tiny reduction in the frequency of insultingly stupid movie suggestions means a lot fewer angry users.

Over the last few years, the RMSE of Cinematch has steadily improved, as has Netflix's success at retaining customers from month to month. Bennett can't prove the two are related, but he's willing to bet on his belief that they are. He refuses to speculate on the dollar value of a 10 percent improvement to Cinematch, but he's certain it's substantially more than \$1 million.

Contest participants retain ownership of the code they write, but the winning team must license it (non-exclusively) to Netflix. The company is already incorporating some of BellKor's ideas into its own system and in the future may buy code from other contestants, as well.

The data set, 100 times larger than any of its kind previously made public, is like a new, free library for specialists in data mining. So the contest has already brought

**Many of the contestants** begin, like Cinematch does, with something called the k-nearest-neighbor algorithm—or, as the pros call it, kNN. This is what Amazon.com uses to tell you that "customers who purchased Y also purchased Z." Suppose Netflix wants to know what you'll think of *Not Another Teen Movie*. It compiles a list of movies that are "neighbors"—films that received a high score from users who also liked *Not Another Teen Movie* and films that received a low score from people who didn't care for that Jaime Pressly yuk-fest. It then predicts your rating based on how you've rated those neighbors. The approach has the advantage of being quite intuitive: If you gave *Scream* five stars, you'll probably enjoy *Not Another Teen Movie*.

BellKor uses kNN, but it also employs more abstruse algorithms that identify dimensions along which movies, and movie watchers, vary. One such scale would be "highbrow" to "lowbrow"; you can rank movies this way, and users too, distinguishing between those who reach for *Children of Men* and those who prefer *Children of the Corn*.

Of course, this system breaks down when applied to people who like both of those movies. You can address this problem by adding more dimensions—rating movies on a "chick flick" to "jock movie" scale or a "horror" to

"romantic comedy" scale. You might imagine that if you kept track of enough of these coordinates, you could use them to profile users' likes and dislikes pretty well. The problem is, how do you know the attributes you've selected are the right ones? Maybe you're analyzing a lot of data that's not really helping you make good predictions, and maybe there are variables that *do* drive people's ratings that you've completely missed.

BellKor (along with lots of other teams) deals with this problem by means of a tool called singular value decomposition, or SVD,

to me to be an important piece of information that should be and needs to be used," he says. Potter has great respect for the technical prowess of BellKor—he is, after all, still behind the team in the rankings—but he thinks the computer science community studying this problem suffers from a bad case of groupthink. He refers to the psychological model underlying their mathematical approach as "crude." His tone suggests that if I weren't taping, he might use a stronger word.

It's easy to say you should take human

has recently given a lot of above-average ratings is likely to continue to do so. Potter finds precisely this phenomenon in the Netflix data; and by being aware of it, he's able to account for its biasing effects and thus more accurately pin down users' true tastes.

Couldn't a pure statistician have also observed the inertia in the ratings? Of course. But there are infinitely many biases, patterns, and anomalies to fish for. And in almost every case, the number-cruncher wouldn't turn up anything. A psychologist, however, can suggest to the statisticians where to point their high-powered mathematical instruments. "It cuts out dead ends," Potter says.

## Potter's math isn't quite up to snuff. But he relies on something that his data-crunching competitors ignore: human psychology.

that determines the best dimensions along which to rate movies. These dimensions aren't human-generated scales like "high-brow" versus "lowbrow"; typically they're baroque mathematical combinations of many ratings that can't be described in words, only in pages-long lists of numbers. At the end, SVD often finds relationships between movies that no film critic could ever have thought of but that do help predict future ratings.

The danger is that it's all too easy to find apparent patterns in what's really random noise. If you use these mathematical hallucinations to predict ratings, you fail. Avoiding that disaster—called overfitting—is a bit of an art; and being very good at it separates masters like BellKor from the rest of the field.

In other words: The computer scientists and statisticians at the top of the leaderboard have developed elaborate and carefully tuned algorithms for representing movie watchers by lists of numbers, from which their tastes in movies can be estimated by a formula. Which is fine, in Gavin Potter's view—except people aren't lists of numbers and don't watch movies as if they were.

**Potter likes to use** what psychologists know about human behavior. "The fact that these ratings were made by humans seems

factors into account—but how, exactly? How can you use psychology to study people about whom you know nothing except what movies they like?

Some things are easy. For example, the Netflix data set now covers eight years of ratings. If you think people's tastes change over time, you might want to weigh recent ratings more heavily than older ones.

A deeper part of Potter's strategy is based on the work of Amos Tversky and Nobel Prize winner Daniel Kahneman, pioneers of the science now called behavioral economics. This new field incorporates into traditional economics those features of human life that are lost when you think of a person as a rational machine, or as a list of numbers representing cinematic taste.

One such phenomenon is the anchoring effect, a problem endemic to any numerical rating scheme. If a customer watches three movies in a row that merit four stars—say, the *Star Wars* trilogy—and then sees one that's a bit better—say, *Blade Runner*—they'll likely give the last movie five stars. But if they started the week with one-star stinkers like the *Star Wars* prequels, *Blade Runner* might get only a 4 or even a 3. Anchoring suggests that rating systems need to take account of inertia—a user who

**We've entered** the long twilight struggle of the Netflix Prize. "The last 1.5 percent is going to be harder than the first 8.5 percent," Potter tells me. In the past three months, BellKor's score has barely budged and now stands at 8.57 percent. Potter, meanwhile, is at 8.07 percent, and his pace has slowed, too. It's entirely possible that neither will ever make it to 10 percent. After all, there's a certain inherent variability to human choices that even the savviest computer can't predict.

Maybe the psychologist and the computer scientists would make more headway if they joined forces. Indeed, BellKor's leading program is actually a blend of 107 different algorithms, and the team is open to adding new ones. Potter has begun mixing more pure mathematics in with his psychology-inspired programs. But the two teams haven't expressed any interest in merging.

Potter says he's "still got juice left," but perhaps not quite enough to get to 10 percent. He's still hopeful though, and he's still testing new ideas. After all, if he wins, he'll be the guy who pointed the way to a new synthesis between psychology and computer science—and pocketed a million dollars in the process. ■

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**JORDAN ELLENBERG** (ellenbergwired@gmail.com) is a math professor at the University of Wisconsin and author of the novel *The Grasshopper King*. For more on the contestants' algorithms, go to [wired.com/extras](http://wired.com/extras).



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# Keep It Simple, Stupid



**The brash boys at 37signals created the software tools that defined Web 2.0. But add features or horsepower? Not a chance. No matter how much you beg.**

BY ANDREW PARK

**To the 300 software developers** packed into a Vancouver conference room, David Heinemeier Hansson was more than a programmer. He was a visionary, the creator of Ruby on Rails, a software template that powered an increasing number of hot Internet applications. He was a philosopher-king whose minimalist ethos suggested a new way of thinking about business and software. And he was a celebrity, with boyish good looks, precocious self-possession, and fans who invoked his name so frequently they used his initials as shorthand: DHH. As Hansson took the stage at the British Columbia Institute of Technology for this, the first Ruby on Rails conference, the room was filled with the kind of giddy excitement that greets the opening chords of a Hannah Montana concert. ¶ The

Ruby on Rails creators Jason Fried (left) and David Heinemeier Hansson.

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program billed Hansson's keynote as a collection of "beloved rants" and "favorite tales from the land of righteous indignation," and he didn't disappoint. He began by congratulating the nascent Ruby on Rails community (and, by extension, himself), citing a litany of impressive achievements: 500,000 downloads of the code, 16 how-to books, mentions in WIRED and other publications, and several industry awards—including, for Hansson, the prestigious Hacker of the Year title, bestowed by Google and O'Reilly Media.

day. Hansson and 37signals cofounder Jason Fried are "revered," says business author Seth Godin. "They are as close as we get to demigods online."

What's more, the pair's once-heretical vision—that there is beauty and wisdom in Web-hosted, bite-size software built to accomplish narrow tasks—has become conventional wisdom. In the two years since Hansson's keynote, Google released Apps, the relatively feature-free alternative to Microsoft's bulky Office suite; Facebook opened its platform to independent

Hansson has a predictable response to such charges. "I don't usually go around saying 'Fuck you' to everyone I meet," he says. "But sometimes it's the appropriate answer."

**The defining characteristic** of Ruby on Rails is, as the name suggests, speed. Using Rails, an adept programmer can create a simple blogging application in 15 minutes or a photo database in five. Two guys built Twitter in two weeks.

In exchange for that speed, programmers accept a Hansson-knows-best approach to software design. While most programming languages require coders to build every new application from scratch, Rails gives developers a set of configurations that lets them bypass the busywork. That makes Rails ideal for quickly creating lean, sparsely designed Web-based applications, which coincidentally enough is exactly what Fried and Hansson think software should look like: as Fried puts it, "stripped down to the absolute bare necessities."

Fried developed his theory of streamlined software design in 1994 as a junior at the University of Arizona. He was looking for a simple database program to catalog his music collection. "I downloaded a bunch and they all sucked," Fried says. Instead of focusing on the relatively easy task, they were overloaded with options that only complicated the process. "I said, 'I can make this way better.'" So he created his own program, dubbed Audiofile, and peddled it as \$20-a-pop shareware, earning enough to keep himself in beer money.

After college, Fried returned to his native Chicago, where he formed 37signals—a Web design firm, named in esoteric reference to SETI—and posted a manifesto on his homepage that railed against the shortcomings of most software. ("The Web should empower, not frustrate," he wrote. "Just because you can doesn't mean you should.") On his protoblog, Signal vs. Noise, he further developed his philosophy. "Remember—size does matter: A small group of 10 great people will outproduce, outwork, outthink a large group of 50 average people."

Fried's missives struck a throbbing nerve, and before long Signal vs. Noise was draw-

## As the world faces a buffet of appetizer-size software, some are losing faith: *What if simple, Web-based apps aren't better than bulkier competitors?*

But not everyone was convinced of Rails' revolutionary potential. Critics had been saying that Rails wasn't versatile enough, that it couldn't handle large amounts of traffic, and that Hansson himself was arrogant. "Arrogant is usually something you hurl at somebody as an insult," Hansson said. "But when I actually looked it up—'having an aggravated sense of one's own importance or abilities'—I thought, sure."

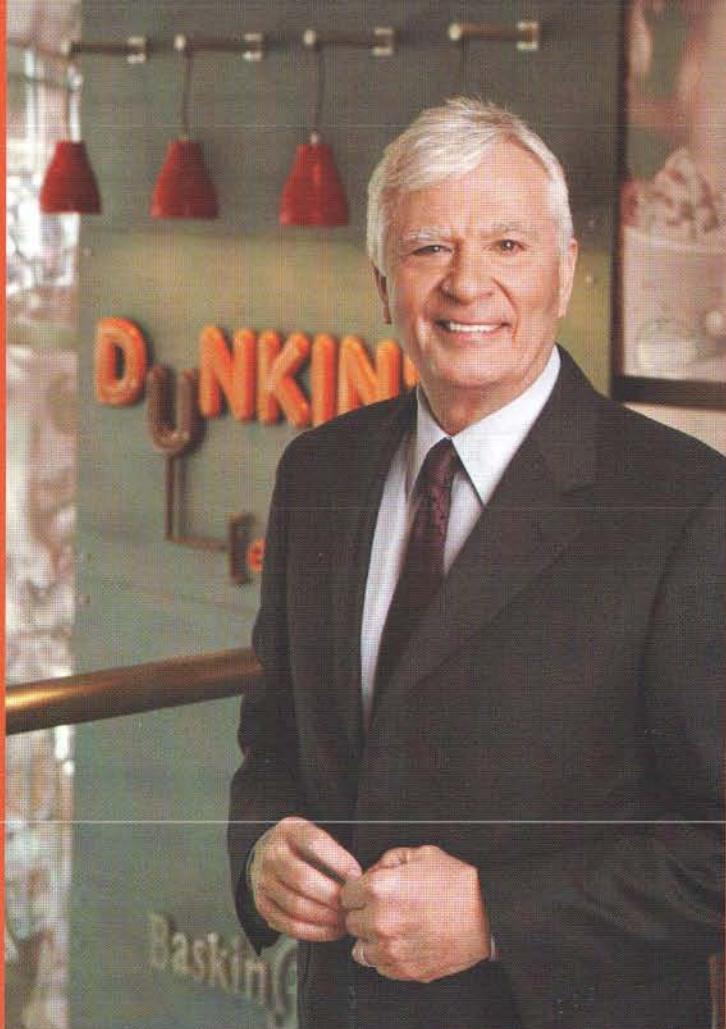
Then he clicked over to the next slide, white letters against a dark background that spelled out his response to the naysayers: FUCK YOU. The crowd erupted into laughter and applause.

Hansson's programmer-with-a-messiah-complex shtick may be a hoary cliché. But in the nearly two years since he delivered this presentation, he and his partners at software developer 37signals have backed up the big talk. Rails has continued its run of popularity; over the years, tens of thousands of programmers have used it to create countless online applications, including podcasting service Odeo and microblogging phenomenon Twitter. And Basecamp, 37signals' Rails-powered, easy-to-use online collaboration software, boasts more than 2 million account holders. Signal vs. Noise, the 37signals blog, pulls in 75,000 readers a

day, unleashing a stream of mini-applications that offer everything from playlist-swapping to Boggle bouts; Salesforce.com's AppExchange gave corporate software developers a platform for selling tiny, downloadable programs; widget wunderkinds like Slide's Max Levchin and RockYou's Lance Tokuda became Web celebrities; and venture capitalists opened their wallets in the hunt for the next little thing. "Simplicity is the most important thing in technology," says Paul Graham, cofounder of early-stage venture firm Y Combinator. "And it's only getting more important."

None of this has helped Hansson discover any hidden wellsprings of modesty. He has called Microsoft "entirely optional," referred to Java as "grossly overused," and described Flash applications as "horrid."

But if Hansson hasn't changed much, neither has the programming framework he created or the business he heads. For some, that's a problem. Hansson and Fried have steadfastly refused to grow their company, beef up their products, or explain their plans for the future. Now, critics argue, the pair's reactionary embrace of all things minimal has made their products less useful and could cost them influence, customers, and millions of dollars.



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[CIT: BEHIND THE BUSINESS]

**You've had a long career in the food-service business. How did you get started?**

I went to Paul Smith College for a hotel and restaurant degree. I began my career in operations with a small food-service management company. Then I joined ARA and in the span of 15 years, I went from vending services to college food service and into corporate marketing, and ultimately became president of ARA's luxury restaurant division. I was able to adapt to every situation, learn and grow. I left to learn the financial side. I took a few seminars at Wharton and joined a small firm to learn deal structures, balance-sheet issues and so on. After that, I joined Marriott and learned to integrate corporate cultures because they had several food-services companies they needed to merge. I left to create Benchmark, an entrepreneurial venture which didn't work out so well, but proved a valuable experience.

**Leaders often say times of difficulty produce the best lessons. Tell us that story.**

I formed Benchmark with a venture-capital group. The cash-restricted environment made it impossible to do what I needed to do. In the end it didn't work, and I suffered a severe financial setback with two kids in college. The lesson here is, before entering any deal, do a lot of due diligence and have a back-up plan.

**How did you bounce back after such a blow?**

I had a good reputation in the industry and got some calls. CA One, which was a subsidiary of Delaware North, needed to overhaul its airport restaurant business, and taking that role was probably my most significant career move. The owners gave me the freedom and the support to do what was necessary. You can't succeed as a leader without support from the owners or the Board. Knowing that taught me a lot about how to lead.

We were first to bring local restaurateurs into airports. It took courage, because many folks didn't believe in what I was doing. But the lessons I'd learned from the Benchmark experience and the support I received made me more courageous and smarter about how to run a business; I understood the value of cash and of making hard decisions. I came back from a dream broken to reset that dream.



## JON L. LUTHER

**Then you made your way into fast food with some of the world's most powerful brands.**

I took all I'd learned about branding and building a culture to Popeyes, which had this wonderful southern Louisiana culture but had lost its way. When I came in 1992, Popeyes thought it was in the fast-food, fried-chicken business. I said, "We're in the Cajun, Creole cuisine business." We introduced po' boys, Chef Paul Prudhomme sauces and Louisiana Legends™; expanded customers' knowledge of New Orleans and southern Louisiana by creating Popeyes Radio in-store; and changed the store image to reflect the Big Easy. The result: We doubled the size of the business in five years.

### **Now you head up Dunkin' Brands, and have shifted Dunkin' Donuts' emphasis to coffee.**

Dunkin' Donuts was a wonderful coffee chain disguised as a donut shop. Nationally, 63% of our sales are coffee-related. Coffee has become such a ritual in America. That ritual was not being presented properly.

### **Did you consider changing the name to Dunkin' Coffee?**

Well, heritage is so important to a brand, and the name Dunkin' Donuts is the soul of the brand. We didn't want to touch that. One of the first things we did, though, was advance our coffee credentials. We launched espresso-

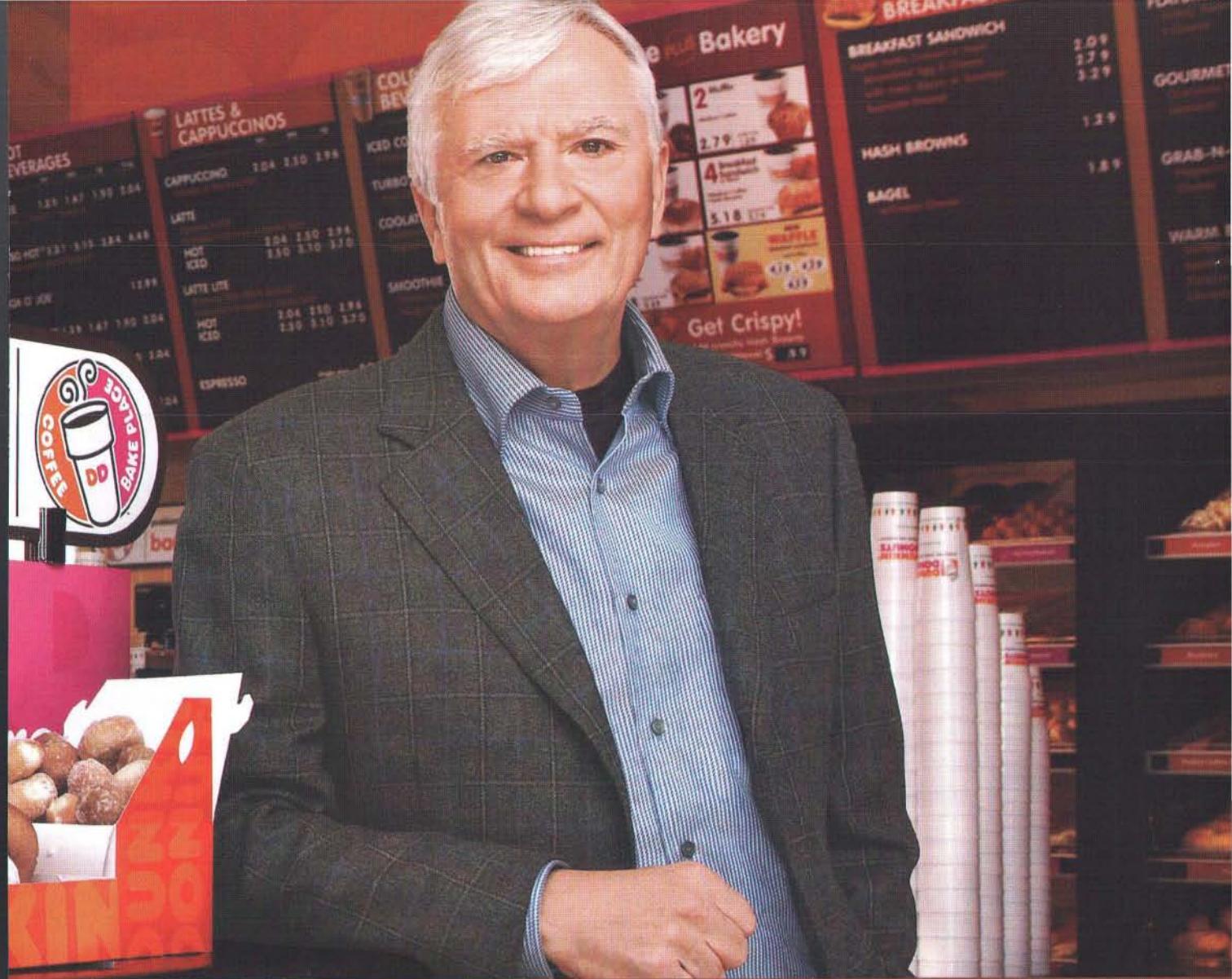
based beverages, which brought us media attention and brought Dunkin' Donuts into the coffee wars.

### **How are you repositioning the brand with the "America Runs on Dunkin'" campaign?**

As we repositioned Dunkin' Donuts as a coffee player, we needed to get away from donuts. "Time to make the donuts" was one of the most successful ad campaigns ever and helped build a great brand heritage. But every company has to renew itself and change the dialogue. We did a tremendous amount of research to understand why consumers loved Dunkin', and the research proved that it really was about the coffee. We looked at our core customers—hard-working people who make America run, who are busy with things to do, who build America on blood, sweat, tears and hope. We realized the way to approach them was by saying, "Dunkin' gets you running and keeps you running." The strategic heartbeat of Dunkin' Donuts is "rituals that revive."

### **What's next?**

To make our march across the country, several things have to happen. Our brand has 99% awareness, but we have to extend demand with strategic marketing alliances. JetBlue serves our coffee to passengers traveling to markets we haven't penetrated thoroughly; 15,000 supermarkets have



## [ CIT: BEHIND THE BUSINESS ]

our beans on their shelves. Now, Sara Lee Food Service will pour our product. That way, our name and product reach into markets before our stores arrive. Every single thing we do aims to reach the consumer who will eventually come to our store and create that "ritual that revives."

### Where is Baskin-Robbins going?

We want to make Baskin-Robbins America's favorite ice-cream shop. We have a new look in stores. We continue to add products such as smoothies; we'll introduce another new item in June. We have over 1,000 flavors in our archive.

The Baskin-Robbins story internationally is greater than it is domestically. We have 870 stores in Japan, 660 in Korea. We're the largest player in the Middle East. In those markets, where people live in smaller spaces and don't store gallons of ice cream, people use a Baskin-Robbins as a meeting-place.

### Can you tell us about your franchise model and plans for growth internationally?

We're 100% franchised, meaning we're stewards of the brand, providing a great product, marketing and support. Franchising is entrepreneurship because franchisees

invest and operate independently, but minimize their risk because of the brand success. Because of this, nine out of ten franchise stores succeed versus one out of ten independent operations. At Baskin-Robbins, entrepreneurs can own two or three stores due to smaller volume; Dunkin' requires more capital and we serve a much broader menu, so it requires franchisees who can handle more complex execution and who are a bit more skilled in marketing. The single most important thing we do is select the right franchisees to ensure our mutual success.

### Dunkin's espresso products are Fair-Trade certified.

**How important will sustainability be to your industry?** Issues of environment, nutrition and protection of growers will be paramount. I believe market forces drive change, and are always ahead of regulatory forces. Three and a half years ago, we began our quest to make our entire menu at Dunkin' Donuts trans-fat free. And we did it. We didn't need government to tell us; we were already on it. We have an obligation to protect our consumers and our communities.

For more insight from this business giant, visit [behindthebusiness.cit.com](http://behindthebusiness.cit.com).

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ing a dedicated readership of programmers and designers similarly fed up with bulky, inelegant code and enthralled by Fried's edicts. It was through his blog that Fried met Hansson: In 2002 Hansson, then a student at Copenhagen Business School, provided some programming advice after Fried posted a question about the best way to handle pagination using a programming language called PHP. The two became fast friends. "Our outlook was the same," Fried says: "Keep it simple." So when Fried wanted an online collaboration tool for his employees, he again turned to Hansson. Working 10 hours a week over four months, Hansson wrote the code to support Fried's spare, airy interface. Hansson used a little-known language named Ruby—which most developers felt was too slow and limited to be of much use—and developed a series of shortcuts to help him build the program quickly and easily.

The result was Basecamp, a lean but effective platform requiring no costly servers, tricky installations, or technical support. Although he'd developed it for in-house use, Fried realized the commercial potential of the program after showing it to friends and clients who wanted an inexpensive and simple way for small teams to work together. When he released Basecamp in February 2004, Fried expected the monthly subscription fees, which today range from \$12 to \$149, to generate sales of \$5,000 a month by the end of Basecamp's first year; they reached that target in six weeks. Five months later, Hansson packaged his Ruby shortcuts and released them as Ruby on Rails, which started winning converts almost immediately.

At the same time their software was taking off, so was the duo's cult of personality. In 2005, Fried gave a 10-minute presentation at Tim O'Reilly's Web 2.0 Summit, the influential confab of some of the Internet's biggest minds. The blogosphere lit up with praise. (The response was so overwhelming that Fried himself posted a blog entry wondering if 37signals had "jumped the shark." Commenters leapt to his defense.) In 2006, the company compiled a list of contrarian dictates—don't plan, don't hire, don't fix

every bug—and published it as *Getting Real*, to rave reviews.

But the key to Fried and Hansson's burgeoning celebrity may have been their \$895-a-seat workshops at which acolytes celebrated the gospel of radical simplicity. After attending one, Ryan Norbauer was inspired to tear down Lovetastic.com, a successful personals site that he had spent eight months creating in PHP, and rewrite the entire thing using Rails. Now Norbauer runs a Rails consultancy. "Rails has become a very big part of my life," he says. "I don't think I would be doing programming for a living without it."

That kind of devotion is common. After Sean Tierney read *Getting Real*, he bought 10 copies for his employees at Grid7, an application development shop, and insisted they read it. "Jason Fried is a genius," says Tierney, who today runs a software startup called Jumpbox. "He's the opposite of everything corporate."

**Tucked away on a grubby** side street in a gentrifying loft-and-warehouse neighborhood about a mile west of downtown Chicago, 37signals' offices hew to the company's small-is-beautiful edict. Actually, *offices* is a strong word: Headquarters consists of four desks shoved up against a wall. 37signals leases its 500 square feet of floor space from a design firm whose employees surround 37signals's work area. There is no 37signals sign, no receptionist, no indication that 37signals even exists. The company has just 10 employees, five of whom telecommute and none of whom are expected to work more than 40 hours a week. But 37signals hasn't remained small out of sloth or through lack of opportunity; indeed, it's taken some effort to keep it from growing. Fried says he has rebuffed numerous inquiries from venture capitalists looking to invest in his company. (The sole exception: Amazon.com founder Jeff Bezos, whose investment firm, Bezos Expeditions, took a minority stake in 37signals in 2006 for an undisclosed amount. The company has said it accepted the deal because it offered access to Bezos, not because of the money.) Neither will Fried entertain

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## Greatest Fits

The 37signals blog, *Signal vs. Noise*, is famous for its indelicacy. Here, a few choice rants from company staff.

"If BusinessWeek wants to say it only takes \$50 and an internet connection to be the next mogul they may want to cite a valid example. It's certainly possible, but Digg isn't that example."

"Windows in general has been like a confused and slow person. Vista is like a person who lost their meds and is trying their best to ignore the voices."

"What's with the social bookmarking icons at the bottom of every single friggin' blog post out there? ... The hectoring is tiresome, it results in extraneous visual noise, and the benefits are dubious at best."

"An open letter to people who wear those Bluetooth headsets that blink: ... That blue light that blinks incessantly can't actually be seen by you. The rest of us, however, do see it. And it annoys us. Stop."

"Only in the perverted world of the Web can something as simple and fundamental as making money be in need of a fancy word like 'monetize.'"

acquisition offers. "Someone on the outside would look at what we do and say, 'Let's ratchet it up to some enterprise level,'" he argues. "I don't want to make our software more complicated. I really don't understand why everyone's interested in Fortune 500 customers. I just don't get that."

37signals may not be targeting corporate behemoths, but its pared-down offerings may be inadequate for even its smaller clients, some of whom have urged Hansson to adapt Rails so it is better suited to handle popular applications. In March 2007, a Twitter engineer told an interviewer that he was having difficulty getting Rails to handle his company's massive spike in traffic. Hansson responded by sending a heated email to Jack Dorsey, Twitter's CEO, and chastising the company on his blog for playing the "blame game" instead of solving its scaling problems itself. (The two firms have since resolved the dispute.) In January, an executive from hosting provider Dreamhost mused about the difficulty some of his clients were having running Rails applications. Again, Hansson responded on his blog: "Wipe the wah-wah tears off your chin and retract the threats of imminent calamity if we don't drop everything we're doing to pursue your needs."

This sort of hostility can't come as a surprise to anyone who has followed Hansson or Fried, but there are signs that their churlishness is beginning to generate some backlash. The Basecamp message boards are filled with complaints from unhappy users, fed up with the software's paucity of features—functionality of the Opera browser, say, or better version tracking of uploaded files—who have switched to competing products. "They take the position that they're right and everyone else is wrong," says Douglas Karr, director of technology for an Internet marketing firm, who stopped using Basecamp in April. "It really just put me off the company." Harper Reed, CTO of online T-shirt retailer Threadless, says that the belligerence of Rails' followers soured him as well. "It's very much like a religion," he says.

What's more, 37signals' ideological objections to outside funding could make them

less able to withstand competition. Nicholas Carr, author of *The Big Switch*, says companies like 37signals won't have the resources to fight should larger firms with huge economies of scale and backend infrastructure decide to take them on. "They're going to have a very tough challenge," he says.

Fried says he doesn't worry about losing individual Basecamp customers, since none of them pay more than \$149 a month. He points out that the company's total revenue doubled in 2007. And in addition to Basecamp, 37signals' other products—subscription-based programs like group-chat app Campfire, content management tool Highrise, and information manager Backpack—pull in hundreds of thousands more users.

But, faced with a seemingly endless buffet of appetizer-size software, industry insiders have begun to question the basic philosophy that Web-based mini-applications are inherently better than their bulkier but more powerful competitors. "Running your application on Rails places a huge limit on what you can do," says Charles Forman, founder of [imlikewithyou.com](http://imlikewithyou.com), who has abandoned the framework for Merb, a rival programming tool. That promises more scalability. A recent survey by the NPD Group found that fewer than 1 percent of desktop PC users had replaced a desktop application—such as Microsoft Office—with a streamlined online alternative like Google Docs, even though the latter is free. Design expert Don Norman, a consultant for Microsoft, says that one reason for the disparity is that customers actually like and use the extra features. "Complexity is a necessary byproduct of the modern age," he says. "When you actually sit down and analyze what you need to get the job done, it's not simplicity."

That's heresy to Fried, Hansson, and their followers. Call it arrogance or idealism, but they would rather fail than adapt. "I'm not designing software for other people," Hansson says. "I'm designing it for me." 

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**ANDREW PARK** (andrewpark4@gmail.com) is a business writer in Chapel Hill, North Carolina.

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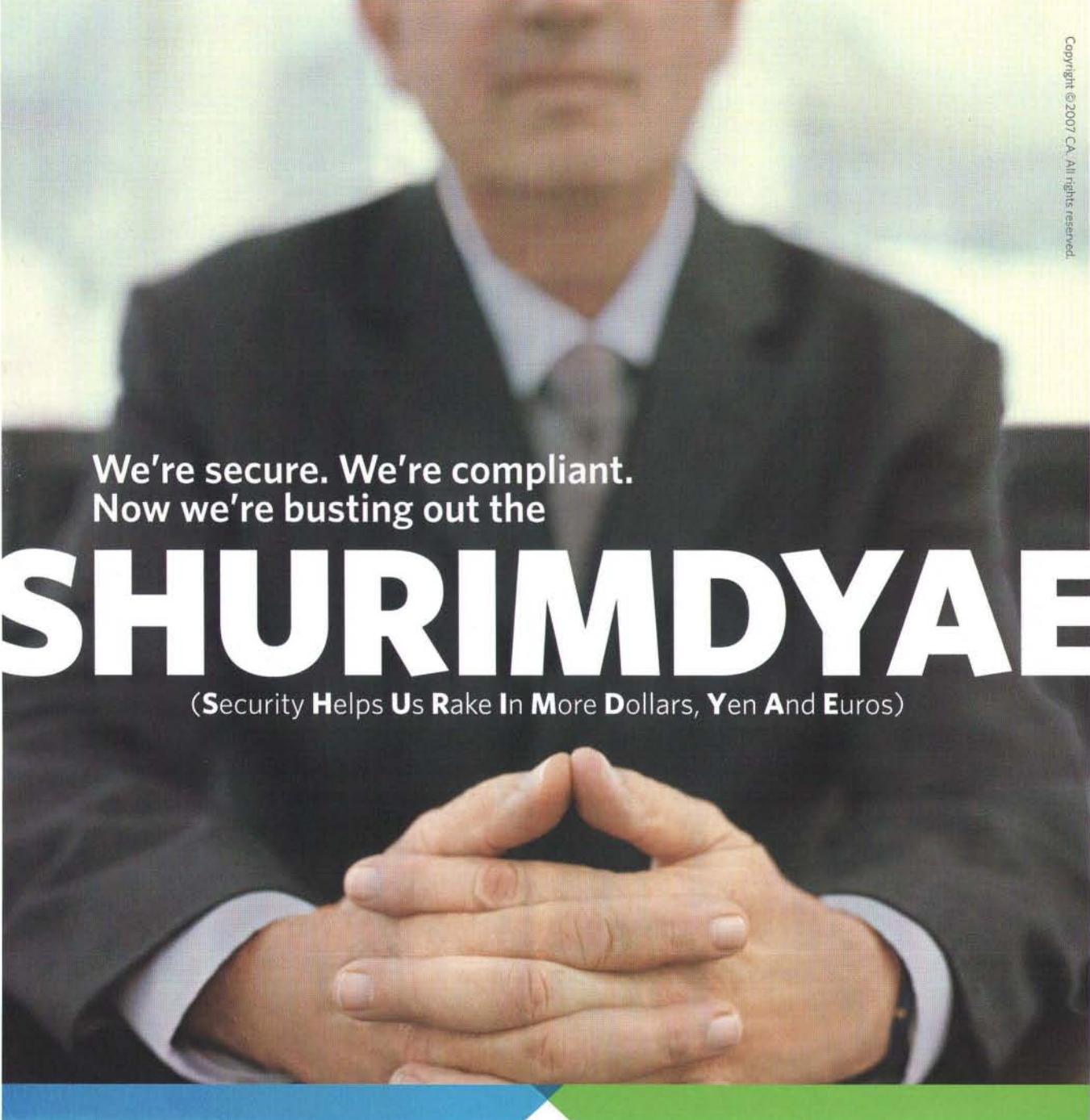
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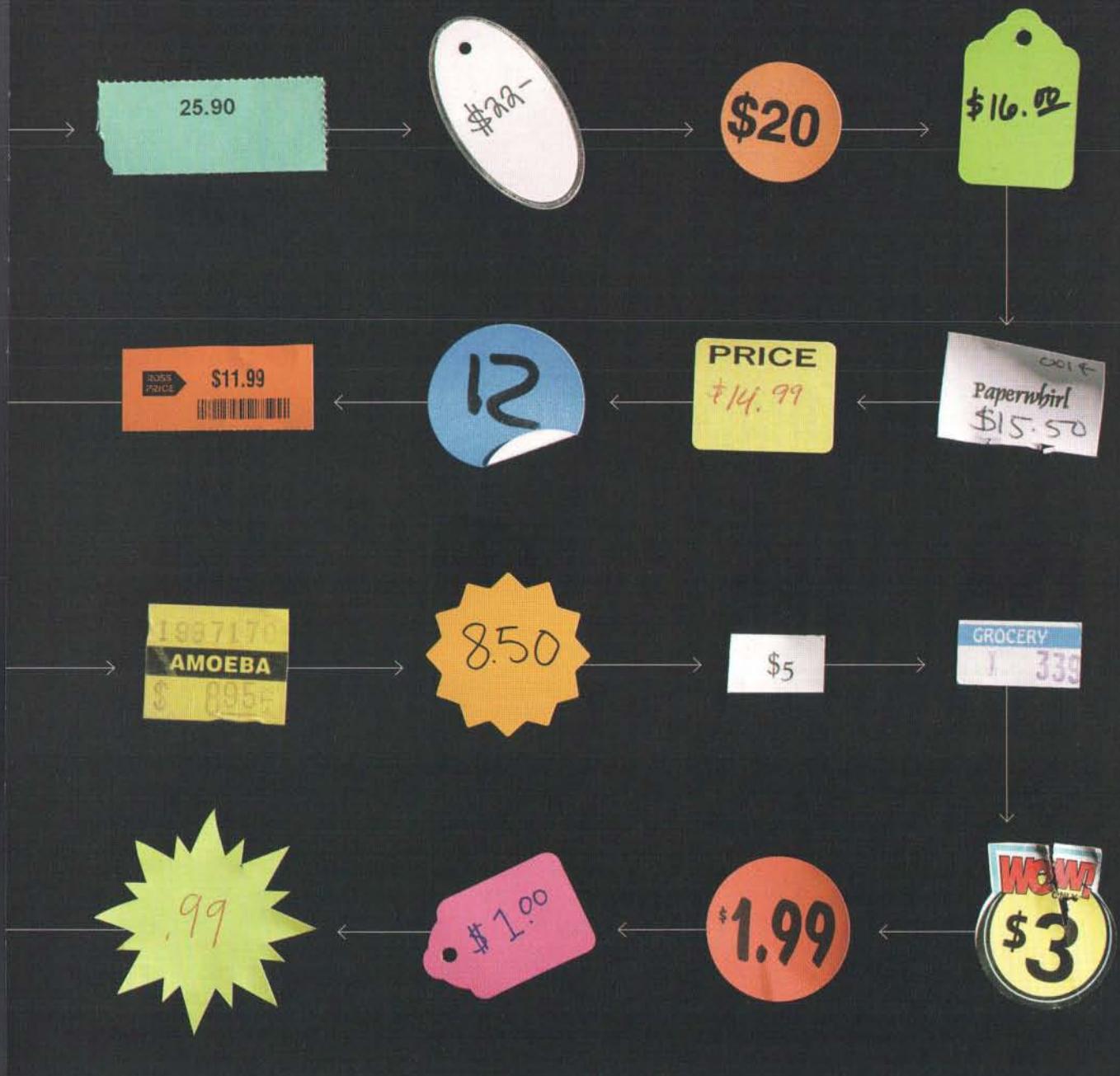
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## WHY \$0.00 IS THE FUTURE

AT THE AGE OF 40, KING GILLETTE WAS A FRUSTRATED INVENTOR, a bitter anticapitalist, and a salesman of cork-lined bottle caps. It was 1895, and despite ideas, energy, and wealthy parents, he had little to show for his work. He blamed the evils of market competition. Indeed, the previous year he had published a book, *The Human Drift*, which argued that all industry should be taken over by a single corporation owned by the public and that millions of Americans should live in a giant city called Metropolis powered by Niagara Falls. His boss at the bottle cap company, meanwhile, had just one piece of advice: Invent something people use and throw away. One day, while he was shaving with a straight razor that was so worn it could no longer be sharpened, the idea came to him. What if the blade could be made of a thin metal strip? Rather than spending time maintaining the blades, men could simply discard them when they became dull. A few years of metallurgy experimentation later, the disposable-blade safety



# OF BUSINESS

by Chris Anderson

PHOTO ILLUSTRATIONS BY JEFF MERMELSTEIN

razor was born. But it didn't take off immediately. In its first year, 1903, Gillette sold a total of 51 razors and 168 blades. Over the next two decades, he tried every marketing gimmick he could think of. He put his own face on the package, making him both legendary and, some people believed, fictional. He sold millions of razors to the Army at a steep discount, hoping the habits soldiers developed at war would carry over to peacetime. He sold razors in bulk to banks so they could give them away with new deposits ("shave and save" campaigns). Razors were bundled with everything from Wrigley's gum to packets of coffee, tea, spices, and marshmallows. The freebies helped to sell those products, but the tactic helped Gillette even more. By giving away the

razors, which were useless by themselves, he was creating demand for disposable blades. A few billion blades later, this business model is now the foundation of entire industries: Give away the cell phone, sell

the monthly plan; make the videogame console cheap and sell expensive games; install fancy coffeemakers in

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offices at no charge so you can sell managers expensive coffee sachets.

Thanks to Gillette, the idea that you can make money by giving something away is no longer radical. But until recently, practically everything “free” was really just the result of what economists would call a cross-subsidy: You’d get one thing free if you bought another, or you’d get a product free only if you paid for a service.

Over the past decade, however, a different sort of free has emerged. The new

**Scenario 1: Low-cost digital distribution**  
will make the summer blockbuster free. Theaters will make their money from concessions—and by selling the premium moviegoing experience at a high price.

had dropped so close to zero that King Gillette could give away both razor *and* blade, and make his money on something else entirely. (Shaving cream?)

You know this freaky land of free as the Web. A decade and a half into the great online experiment, the last debates over free versus pay online are ending. In 2007 *The New York Times* went free; this year, so will much of *The Wall Street Journal*. (The remaining fee-based parts, new owner Rupert Murdoch announced, will be “really special ... and, sorry to tell you, probably more expensive.”) This calls to mind one version of Stewart Brand’s original aphorism from 1984: “Information wants to be free. Information also wants to be expensive ... That tension will not go away.”

Once a marketing gimmick, free has emerged as a full-fledged economy. Offering free music proved successful for Radiohead, Trent Reznor of Nine Inch Nails, and a swarm of other bands on MySpace that grasped the audience-building merits of zero. The fastest-growing parts of the gaming industry are ad-supported casual games online and free-to-try massively multiplayer online games. Virtually everything Google does is free to consumers, from Gmail to Picasa to GOOG-411.

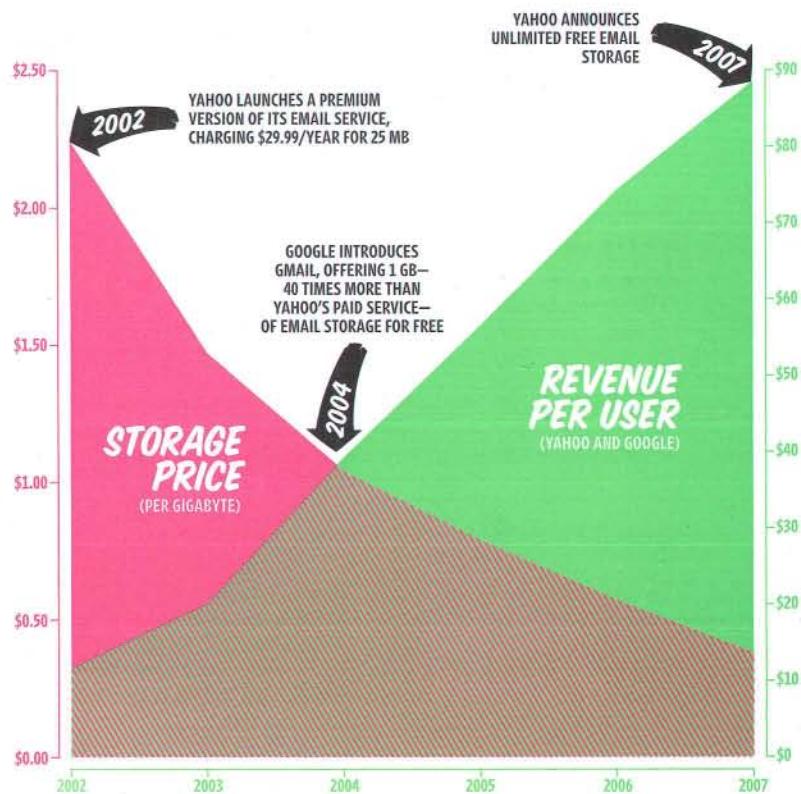
The rise of “freetronics” is being driven by the underlying technologies that power the Web. Just as Moore’s law dictates that a unit of processing power halves in price every 18 months, the price of bandwidth and storage is dropping even faster. Which

is to say, the trend lines that determine the cost of doing business online all point the same way: to zero.

But tell that to the poor CIO who just shelled out six figures to buy another rack of servers. Technology sure doesn’t feel free when you’re buying it by the gross. Yet if you look at it from the other side of the fat pipe, the economics change. That expensive bank of hard drives (fixed costs) can serve tens of thousands of users (marginal costs). The Web is all about scale, finding ways to attract the most users for centralized resources, spreading those costs over larger and larger audiences as the technology gets more and more capable. It’s not about the cost of the equipment in the racks at the data center; it’s about what that equipment can do. And every year, like some sort of magic clockwork, it does more and more for less and less, bringing the marginal costs of technology in the units that we individuals consume closer to zero.

As much as we complain about how expensive things are getting, we’re surrounded by forces that are making them cheaper. Forty years ago, the principal nutritional problem in America was hunger; now it’s obesity, for which we have the Green Revolution to thank. Forty years ago, charity was dominated by clothing drives for the poor. Now you can get a T-shirt for less than the price of a cup of coffee, thanks to China and global sourcing. So too for toys, gadgets, and commodities of every sort. Even cocaine has pretty much never been cheaper (globalization works in mysterious ways).

Digital technology benefits from these dynamics and from something else even more powerful: the 20th-century shift from Newtonian to quantum machines. We’re still just beginning to exploit atomic-scale effects in revolutionary new materials—semiconductors (processing power), ferromagnetic compounds (storage), and fiber optics (bandwidth). In the arc of history, all three sub-



## WEBMAIL WINDFALL

For years, webmail users had to pay for extra storage. Then, as storage prices continued to fall, Google went after new customers by offering 1 gigabyte free to every user. Yahoo responded last year with the ultimate offer: infinite free storage. Since each page of webmail comes with ads, more users means more revenue.

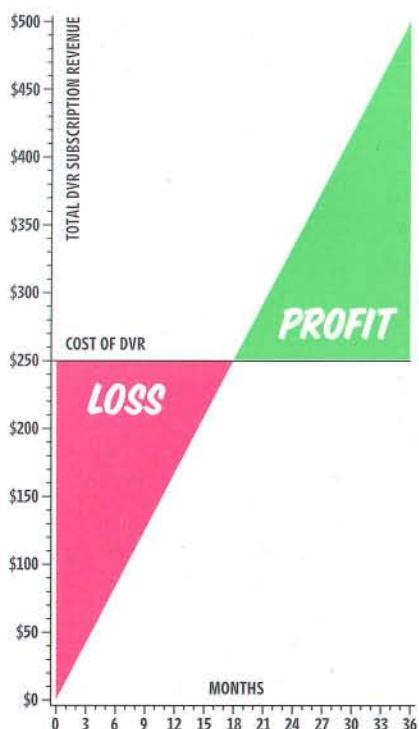


# HOW CAN A DVR BE FREE?

Phone companies sell calls; electronics companies sell gadgets. But cable giant Comcast is in both those businesses and a lot more besides. This gives it flexibility to cross-subsidize products, making one thing free in order to sell another. To that end, Comcast has given about 9 million subscribers free set-top digital video recorders. How can it make that money back?

**A) Add hidden fees.** Comcast charges a \$19.99 installation fee to every new DVR customer. **B) Charge a monthly subscription.** Comcast customers pay \$13.95 a month to use the DVR box. Even if Comcast paid \$250 for its DVRs—a very high estimate—the boxes would pay for themselves within 18 months. **C) Upsell other services.** Comcast hopes to win over new customers with its free DVRs and then interest them in other services—like high-speed Internet (\$43 a month for 8 Mbps) and digital telephony (\$39.95 a month). And that doesn't count the pay-per-view movies, which cost DVR users about \$5 each.

**Comcast earns back the cost of its DVR in 18 months.**



SOURCES: COMCAST, FORRESTER RESEARCH

stances are still new, and we have a lot to learn about them. We are just a few decades into the discovery of a new world.

What does this mean for the notion of free? Well, just take one example. Last year, Yahoo announced that Yahoo Mail, its free webmail service, would provide unlimited storage. Just in case that wasn't totally clear, that's "unlimited" as in "infinite." So the market price of online storage, at least for email, has now fallen to zero (see "Webmail Windfall," previous page). And the stunning thing is that nobody was surprised; many had assumed infinite free storage was already the case.

For good reason: It's now clear that practically everything Web technology touches starts down the path to gratis, at least as far as we consumers are concerned. Storage now joins bandwidth (YouTube: free) and processing power (Google: free) in the race to the bottom. Basic economics tells us that in a competitive market, price falls to the marginal cost. There's never been a more competitive market than the Internet, and every day the marginal cost of digital information comes closer to nothing.

One of the old jokes from the late-'90s bubble was that there are only two numbers on the Internet: infinity and zero. The first, at least as it applied to stock market valuations, proved false. But the second is alive and well. The Web has become the land of the free.

The result is that we now have not one but two trends driving the spread of free business models across the economy. The first is the extension of King Gillette's cross-subsidy to more and more industries. Technology is giving companies greater flexibility in how broadly they can define their markets, allowing them more freedom to give away products or services to one set of customers while selling to another set. Ryanair, for instance, has disrupted its industry by defining itself more as a full-service travel agency than a seller of airline seats (see "How Can Air Travel Be Free?" page 146).

The second trend is simply that anything that touches digital networks quickly feels the effect of falling costs. There's nothing new about technology's deflationary force, but what is new is the speed at which industries of all sorts are becoming digital businesses and thus able to exploit those economics. When Google turned advertising into a software application, a classic services

business formerly based on human economics (things get more expensive each year) switched to software economics (things get cheaper). So, too, for everything from banking to gambling. The moment a company's primary expenses become things based in silicon, free becomes not just an option but the inevitable destination.

## WASTE AND WASTE AGAIN

Forty years ago, Caltech professor Carver Mead identified the corollary to Moore's law of ever-increasing computing power. Every 18 months, Mead observed, the price of a transistor would halve. And so it did, going from tens of dollars in the 1960s to approximately 0.000001 cent today for each of the transistors in Intel's latest quad-core. This, Mead realized, meant that we should start to "waste" transistors.

Scenario 2: Ads on the subway? That's so 20th century. By sponsoring the whole line and making trips free, the local merchants association brings grateful commuters to neighborhood shops.

*Waste* is a dirty word, and that was especially true in the IT world of the 1970s. An entire generation of computer professionals had been taught that their job was to dole out expensive computer resources sparingly. In the glass-walled facilities of the mainframe era, these systems operators exercised their power by choosing whose programs should be allowed to run on the costly computing machines. Their role was to conserve transistors, and they not only decided what was worthy but also encouraged programmers to make the most economical use of their computer time. As a result, early developers devoted as much code as possible to running their core algorithms efficiently and gave little thought to user interface. This was the era of the command line, and the only conceivable reason someone might have wanted to use a computer at home was to organize recipe files. In fact, the world's first personal computer, a stylish kitchen appliance offered by Honeywell in 1969, came with integrated counter space.

And here was Mead, telling programmers to embrace waste. They scratched their heads—how do you waste computer power? It took Alan Kay, an engineer working at Xerox's Palo Alto Research Center, to show them. Rather than conserve transistors for core processing functions, he developed a computer concept—the Dynabook—that

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Trade Center \$4





# HOW CAN AIR TRAVEL BE FREE?

Every year, about 1.3 million passengers fly from London to Barcelona. A ticket on Dublin-based low-cost airline Ryanair is just \$20 (10 pounds). Other routes are similarly cheap, and Ryanair's CEO has said he hopes to one day offer all seats on his flights for free (perhaps offset by in-air gambling, turning his planes into flying casinos). How can a flight across the English Channel be cheaper than the cab ride to your hotel?

**A) Cut costs:** Ryanair boards and disembarks passengers from the tarmac to trim gate fees. The airline also negotiates lower access fees from less-popular airports eager for traffic. **B) Ramp up the ancillary fees:** Ryanair charges for in-flight food and beverages; assesses extra fees for pre-boarding, checked baggage, and flying with an infant; collects a share of car rentals and hotel reservations booked through the Web site; charges marketers for in-flight advertising; and levies a credit-card handling fee for all ticket purchases. **C) Offset losses with higher fares:** On popular travel days, the same flight can cost more than \$100.

It costs Ryanair \$70 to fly someone from London to Barcelona. Here is how it gets that money back.



SOURCES: INVISEOMEDIA, RYANAIR

would frivolously deploy silicon to do silly things: draw icons, windows, pointers, and even animations on the screen. The purpose of this profligate eye candy? Ease of use for regular folks, including children. Kay's work on the graphical user interface became the inspiration for the Xerox Alto, and then the Apple Macintosh, which changed the world by opening computing to the rest of us. (We, in turn, found no shortage of things to do with it; tellingly, organizing recipes was not high on the list.)

Of course, computers were not free then, and they are not free today. But what Mead and Kay understood was that the transistors in them—the atomic units of computation—would become so numerous that on an individual basis, they'd be close enough to costless that they might as well be free. That meant software writers, liberated from worrying about scarce computational resources like memory and CPU cycles, could become more and more ambitious, focusing on higher-order functions such as user interfaces and new markets such as entertainment. And that meant software of broader appeal, which brought in more users, who in turn found even more uses for computers. Thanks to that wasteful throwing of transistors against the wall, the world was changed.

What's interesting is that transistors (or storage, or bandwidth) don't have to be completely free to invoke this effect. At a certain

point, they're cheap enough to be safely disregarded. The Greek philosopher Zeno wrestled with this concept in a slightly different context. In Zeno's dichotomy paradox, you run toward a wall. As you run, you halve the distance to the wall, then halve it again, and so on. But if you continue to subdivide space forever, how can you ever actually reach the wall? (The answer is that you can't: Once you're within a few nanometers, atomic repulsion forces become too strong for you to get any closer.)

In economics, the parallel is this: If the unitary cost of technology ("per megabyte" or "per megabit per second" or "per thousand floating-point operations per second") is halving every 18 months, when does it come close enough to zero to say that you've arrived and can safely round down to nothing? The answer: almost always sooner than you think.

What Mead understood is that a psychological switch should flip as things head toward zero. Even though they may never become entirely free, as the price drops there is great advantage to be had in treating them as if they *were* free. Not too cheap to *meter*, as Atomic Energy Commission chief Lewis Strauss said in a different context, but too cheap to *matter*. Indeed, the history of technological innovation has been marked by people spotting such price and performance trends and getting ahead of them.

From the consumer's perspective, though, there is a huge difference between cheap and free. Give a product away and it can go viral. Charge a single cent for it and you're in an entirely different business, one of clawing and scratching for every customer. The psychology of "free" is powerful indeed, as any marketer will tell you.

This difference between cheap and free is what venture capitalist Josh Kopelman calls the "penny gap." People think demand is elastic and that volume falls in a straight line as price rises, but the truth is that zero is one market and any other price is another. In many cases, that's the difference between a great market and none at all.

The huge psychological gap between "almost zero" and "zero" is why micro-payments failed. It's why Google doesn't show up on your credit card. It's why modern Web companies don't charge their users anything. And it's why Yahoo gives away disk drive space. The question of infinite storage was not *if* but *when*. The

winners made their stuff free first.

Traditionalists wring their hands about the “vaporization of value” and “demonetization” of entire industries. The success of Craigslist’s free listings, for instance, has hurt the newspaper classified ad business. But that lost newspaper revenue is certainly not ending up in the Craigslist coffers. In 2006, the site earned an estimated \$40 million from the few things it charges for. That’s about 12 percent of the \$326 million by which classified ad revenue declined that year.

But free is not quite as simple—or as stupid—as it sounds. Just because products are free doesn’t mean that someone, somewhere, isn’t making huge gobs of money. Google is the prime example of this. The monetary benefits of Craigslist are enormous as well, but they’re distributed among its tens of thousands of users rather than funneled straight to Craig Newmark Inc. To follow the money, you have to shift from a basic view of a market as a matching of two parties—buyers and sellers—to a broader sense of an ecosystem with many parties, only some of which exchange cash.

The most common of the economies built around free is the three-party system. Here a third party pays to participate in a market created by a free exchange between the first two parties. Sound complicated? You’re probably experiencing it right now. It’s the basis of virtually all media.

In the traditional media model, a publisher provides a product free (or nearly free) to consumers, and advertisers pay to ride along. Radio is “free to air,” and so is much of television. Likewise, newspaper and magazine publishers don’t charge readers anything close to the actual cost of creating, printing, and distributing their products. They’re not selling papers and magazines to readers, they’re selling readers to advertisers. It’s a three-way market.

In a sense, what the Web represents is the extension of the media business model to industries of all sorts. This is not simply the notion that advertising will pay for everything. There are dozens of ways that media companies make money around free content, from selling information about consumers to brand licensing, “value-added” subscriptions, and direct ecommerce (see [wired.com/extras](http://wired.com/extras) for a complete list). Now an entire ecosystem of Web companies is growing up around the same set of models.

## A TAXONOMY OF FREE

Between new ways companies have found to subsidize products and the falling cost of doing business in a digital age, the opportunities to adopt a free business model of some sort have never been greater. But which one? And how many are there? Probably hundreds, but the priceless economy can be broken down into six broad categories:

### • “FREEUMUM”

*What’s free: Web software and services, some content. Free to whom: users of the basic version.*

This term, coined by venture capitalist Fred Wilson, is the basis of the subscription model of media and is one of the most common Web business models. It can take a range of forms: varying tiers of content, from free to expensive, or a premium “pro” version of some site or software with more features than the free version (think Flickr and the \$25-a-year Flickr Pro).

Again, this sounds familiar. Isn’t it just the free sample model found everywhere from perfume counters to street corners? Yes, but with a pretty significant twist. The traditional free sample is the promotional candy bar handout or the diapers mailed to a new mother. Since these samples have real costs, the manufacturer gives away only a tiny quantity—hoping to hook consumers and stimulate demand for many more.

But for digital products, this ratio of free to paid is reversed. A typical online site follows the 1 Percent Rule—1 percent of users support all the rest. In the freemium model, that means for every user who pays for the premium version of the site, 99 others get the basic free version. The reason this works is that the cost of serving the 99 percent is close enough to zero to call it nothing.

### • ADVERTISING

*What’s free: content, services, software, and more. Free to whom: everyone.*

Broadcast commercials and print display ads have given way to a blizzard of new Web-based ad formats: Yahoo’s pay-per-pageview banners, Google’s pay-per-click text ads, Amazon’s pay-per-transaction “affiliate ads,” and site sponsorships were just the start. Then came the next wave: paid inclusion in search results, paid listing in information services, and lead generation, where a third party pays for the names of people interested in a certain subject. Now companies



# HOW CAN A CD BE FREE?

Last July, Prince debuted his new album, *Planet Earth*, by stuffing a copy—retail value \$19—into 2.8 million issues of the Sunday edition of London’s *Daily Mail*. (The paper often includes a CD, but this was the first time it featured all-new material from a star.) How can a platinum artist give away a new release? And how can a newspaper distribute it free of charge?

**A) Prince spurred ticket sales.** Strictly speaking, the artist lost money on the deal. He charged the *Daily Mail* a licensing fee of 36 cents a disc rather than his customary \$2. But he more than made up the difference in ticket sales. The Purple One sold out 21 shows at London’s O2 Arena in August, bringing him record concert revenue for the region.

**B) The Daily Mail boosted its brand.** The freebie bumped up the newspaper’s circulation 20 percent that day. That brought in extra revenue, but not enough to cover expenses. Still, *Daily Mail* execs consider the giveaway a success. Managing editor Stephen Miron says the gimmick worked editorially and financially: “Because we’re pioneers, advertisers want to be with us.”

**Prince made money by giving away his new disc.**

## PRINCE

POTENTIAL LICENSING REVENUE	(\$5.6M)
DAILY MAIL LICENSING REVENUE	\$1M
LONDON CONCERT GROSS	\$23.4M
NET REVENUE	\$18.8M

## THE DAILY MAIL

LICENSING FEE	(\$1M)
PRODUCTION/PROMOTION	(\$1M)
INCREMENTAL NEWSSTAND REVENUE	\$1.3M

SOURCES: DAILY MAIL, O2 ARENA



are trying everything from product placement (PayPerPost) to pay-per-connection on social networks like Facebook. All of these approaches are based on the principle that free offerings build audiences with distinct interests and expressed needs that advertisers will pay to reach.

#### • CROSS-SUBSIDIES

*What's free: any product that entices you to pay for something else. Free to whom: everyone willing to pay eventually, one way or another.*

When Wal-Mart charges \$15 for a new hit DVD, it's a loss leader. The company is offering the DVD below cost to lure you into the store, where it hopes to sell you a washing machine at a profit. Expensive wine subsi-

dizes food in a restaurant, and the original "free lunch" was a gratis meal for anyone who ordered at least one beer in San Francisco saloons in the late 1800s. In any package of products and services, from banking to mobile calling plans, the price of each individual component is often determined by psychology, not cost. Your cell phone company may not make money on your monthly minutes—it keeps that fee low because it knows that's the first thing you look at when picking a carrier—but your monthly voicemail fee is pure profit.

On a busy corner in São Paulo, Brazil, street vendors pitch the latest "tecnobrega" CDs, including one by a hot band called Banda Calypso. Like CDs from most street vendors,

Scenario 3: It's a free second-gen Wii! But only if you buy the deluxe version of Rock Band.

these did not come from a record label. But neither are they illicit. They came directly from the band. Calypso distributes masters of its CDs and CD liner art to street vendor networks in towns it plans to tour, with full agreement that the vendors will copy the CDs, sell them, and keep all the money. That's OK, because selling discs isn't Calypso's main source of income. The band is really in the performance business—and business is good. Traveling from town to town this way, preceded by a wave of supercheap CDs, Calypso has filled its shows and paid for a private jet.

The vendors generate literal street cred in each town Calypso visits, and its omnipresence in the urban soundscape means



that it gets huge crowds to its rave/dj/concert events. Free music is just publicity for a far more lucrative tour business. Nobody thinks of this as piracy.

#### • ZERO MARGINAL COST

*What's free: things that can be distributed without an appreciable cost to anyone. Free to whom: everyone.*

This describes nothing so well as online music. Between digital reproduction and peer-to-peer distribution, the real cost of distributing music has truly hit bottom. This is a case where the product has become free because of sheer economic gravity, with or without a business model. That force is so powerful that laws, guilt trips, DRM, and every other barrier to piracy the labels can

think of have failed. Some artists give away their music online as a way of marketing concerts, merchandise, licensing, and other paid fare. But others have simply accepted that, for them, music is not a moneymaking business. It's something they do for other reasons, from fun to creative expression. Which, of course, has always been true for most musicians anyway.

#### • LABOR EXCHANGE

*What's free: Web sites and services. Free to whom: all users, since the act of using these sites and services actually creates something of value.*

You can get free porn if you solve a few captchas, those scrambled text boxes used to block bots. What you're actually doing is giving answers to a bot used by spammers to gain access to other sites—which is worth more to them than the bandwidth you'll consume browsing images. Likewise for rating stories on Digg, voting on Yahoo Answers, or using Google's 411 service (see "How Can Directory Assistance Be Free?" this page). In each case, the act of using the service creates something of value, either improving the service itself or creating information that can be useful somewhere else.

#### • GIFT ECONOMY

*What's free: the whole enchilada, be it open source software or user-generated content. Free to whom: everyone.*

From Freecycle (free secondhand goods for anyone who will take them away) to Wikipedia, we are discovering that money isn't the only motivator. Altruism has always existed, but the Web gives it a platform where the actions of individuals can have global impact. In a sense, zero-cost distribution has turned sharing into an industry. In the monetary economy it all looks free—indeed, in the monetary economy it looks like unfair competition—but that says more about our shortsighted ways of measuring value than it does about the worth of what's created.

#### THE ECONOMICS OF ABUNDANCE

Enabled by the miracle of abundance, digital economics has turned traditional economics upside down. Read your college textbook and it's likely to define economics as "the social science of choice under scarcity." The entire field is built on studying trade-offs and how they're made. | **CONTINUED ON PAGE 194**



# HOW CAN DIRECTORY ASSISTANCE BE FREE?

AT&T and its competitors rake in \$7 billion a year from directory assistance, charging 50 cents to \$1.75 per call. Google, on the other hand, offers its automated GOOG-411 service gratis. How can the search juggernaut afford not to charge?

**A) Get free data.** Each time callers to GOOG-411 request a phone number, they're giving Google valuable information. Each call provides voice data representing unique variations in accent, phrasing, and business names that Google uses to improve its service. Estimated market value of that data since the service launched last spring: \$14 million.

**B) Invest in the next big thing.** Still, the value of that information hardly compares with potential earnings if Google were to charge \$1 per call. Why give away the store? Honcho Peter Norvig has said that GOOG-411 is a test bed for a voice-driven search engine for mobile phones. If it serves ads to those phones, Google's share of that market could be measured in billions.

**Google gives up revenue now to gain access to a hot market later.**

GOOGLE'S  
PROJECTED  
REVENUE FROM  
THE NORTH  
AMERICAN  
AND EUROPEAN  
MOBILE  
SEARCH MARKET  
IN 2012

**\$2.5B**

POTENTIAL  
GOOG-411 REVENUE  
SACRIFICED  
BY 2012, BASED  
ON CURRENT  
ESTIMATED CALL  
VOLUME

**\$144M**

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NOVEMBER 22, 2024

UNITED STATES

# PRESIDENTIAL ELECTION 2024

This entry is under [dispute](#).

The presidential election of 2024 was the second of the 21st century to end in a constitutional crisis. As the Supreme Court prepares to hear oral arguments to settle the dispute, here's a recap of the tumultuous campaign season. **BY STEVE BODOW**

## What's News

\* \* \*

### Business and Finance

**> Boeing said its 858 GigaJet would be further delayed.** CEO Hanashan blamed hardware, software, wetware and firmware troubles, as well as Indian government red tape.  
[read more](#)

\* \* \*

**> Stocks are expected to climb today** as the markets anticipate a resolution of *Rodriguez v. Chen*<sup>2,3</sup>. European shares crept higher in a.m. sessions.  
[read more](#)

\* \* \*

**> Bernanke retracted his statement that the business cycle is controlled by elves.** The outgoing Fed chair explained that he was just tired. So tired.  
[read more](#)

\* \* \*

**> DupraPhob's fourth-quarter net soared 65%.** It is still not known exactly what the pharm-tech firm does or makes.  
[read more](#)

## Background

After the 2013 spectacle of her father, Al Gore Jr., declaring himself "Global Planet Czar" and taking refuge in a vast bunker complex beneath Greenland, few foresaw a political career for Kristen Gore. But thanks to a famous family name and an unusually thin pool of other candidates, in 2020 Ms. Gore coasted to a landslide win over the incumbent, Republican Ralph Reed, with her populist platform of "Lighten Up, America!"

Given such rhetoric, it shouldn't have been surprising that the former sitcom writer's policy portfolio turned out to be little more than a series of quixotic schemes. Gore's pledge to use her first 100 days in office to eradicate carpal tunnel syndrome proved a harbinger. Her \$35 billion "Carrot-Car 2030" initiative, aimed at building a passenger vehicle powered by root vegetables and made entirely from cellulose polymer, never got past the

*Young voters loved Chen's bio-animated tattoo and his habit of skydiving into reality-TV finales from his private Boeing 848.*

napkin-sketch phase [\[citation needed\]](#). And her State of the Union call to retrofit the Air Force fleet with antigravity engines met its end in an awkward email from national science adviser Bill Nye. Even an executive order, he explained, couldn't rescind Newton's laws.

Meanwhile, the world outside the White House



No-clone activists picket the Supreme Court in advance of Monday's oral arguments.

was crumbling. Not only was former President Obama's watershed 2014 Phased Withdrawal Plan from Iraq still half a decade from completion, the Pakghaniran War to the east—once a simple seven-sided fight between Pakistani, Afghani, and Iranian peoples of historical and irreconcilable mutual hatreds—was becoming complicated. By summer 2023, it had become a proxy hydrocarbon fight between China and the breakaway Republic of Shanghai. As readers will recall, Shanghai financed Turkmenistanis who were mounting a new northern offensive, drawing Pashtun support away from Tajik tribesmen and toward Peshawar mercenaries fighting Pakistani and/or Iranian armies in the Baluchi desert, thus aiding Shanghai's covert effort to block China's petro-port in Karachi. Long story short: By Thanksgiving, gasoline in the US rose to \$11 a gallon, despite President Gore's having devalued the gallon to just three quarts.

On the domestic front, the first wave of mad-chicken disease—thought to have originated when antibiotic-resistant organisms in poultry feed became addicted to methamphetamine [[shred of evidence needed](#)—was forcing millions of Americans to eat tofu.

Gore's decision not to seek a second term, announced in March 2023, was a tremendous relief for an anxious nation and set the stage for a truly historic contest.

## Primaries

The Republican party's early favorite was Mike Michaels, governor of the nation's richest state, Wyoming—or, as it has come to be known, the [United Rockies Emirates](#). Michaels had won fans for his handling of the unique challenges faced by the URE after the 2010 nat-gas boom, in particular the influx of nearly 350,000 Indonesian maids, houseboys, and chauffeurs.

Michaels' chief GOP rival was California nanoservices tycoon Reed Chen. Chen seemed to embody the American dream: youngest child of Fujian immigrants, a graduate of UC Berkeley, self-made deca-billionaire, extraordinary cheekbones said to have been achieved without surgical enhancement—and now, brash Libertarian candidate for president. He had few positions on specific political issues, advocating generally for radically hands-off government at home and steroid-laden adventurism abroad. Young voters loved his bio-animated shoulder tattoo, and his penchant for skydiving into reality-TV finales from his private Boeing 848 didn't hurt. After seeing the ratings during May sweeps, the GOP quickly closed ranks around Chen. He would become the country's first Asian presidential nominee.

Democrats homed in faster on their front-runner: As early as summer 2023, USA Today/Novartis' neuroprojection polling, surveying electrical pat-



Chen and Rodriguez face off in San Juan.

terns in likely voters' amygdala, predicted that the Dems would nominate Marisol Rodriguez, the liberal two-term Texas governor known to friends and foes alike as May-Rod. Rodriguez made a small fortune buying up foreclosed San Antonio real estate in the late-'00s subprime loan crisis before entering politics nearly 15 years ago. As governor, she was noted for pushing through a controversial ban on Picture-in-Picture-in-Picture in classroom [WideNet](#) viewers. The resulting drop in fourth-grade ADD levels, to a mere 50 percent, vaulted May-Rod to national prominence.

## The General Campaign

**Rodriguez vs. Chen:** The nominees seemed to have opposing positions on nearly every issue. Rodriguez wanted to expand AutoCare, the federal car-insurance entitlement for baby-boomer seniors, to include golf carts; Chen argued that mandatory car insurance was unconstitutional. Rodriguez supported the Senate's [Franken-Limbaugh](#) synth-soy subsidy bill; Chen, not so much. And while Rodriguez argued that the US should build its proposed gray-goo containment plant in a Nevada mountainside, nano-titan Chen argued passionately, if predictably, that there was no such thing as gray goo.

But something was bothering voters: the candidates' lack of foreign policy expertise. This weakness

TOUCH TO ADVANCE

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**What's News**

\* \* \*

*Nation*

**> Genetic body-mod demonstrations continued** on college campuses. Students across the nation are protesting the 2019 federal ban on GM tails and other appendages, arguing that they have a First Amendment right to free expression.  
[read more](#)

\* \* \*

**> D'Antoine "Unca" Gregory died of bionic heart failure.** The 62-year-old was the last man to make money in the music business.  
[read more](#)

\* \* \*

*World*

**> Brazil repealed its thong swimsuit ban after just four days.** Catholic leaders admitted they hadn't foreseen such massive and violent nude-mob protests.  
[read more](#)

**UNITED STATES****PRESIDENTIAL ELECTION, 2024 CONT.**

Continued from previous screen.

was highlighted by the emergence of a new global crisis. In summer 2024, a Finnish mining firm contracted by Nokia staked a claim to Bosnia's massive reserves of coltan, the scarce metallic ore used in producing mobile devices. Japan, which bases its economy almost entirely on the manufacture of mobiltronics, perceived the move as a dire competitive threat and immediately dispatched its all-bot army into the mines. Fighting between the bots and Finnish-backed Bosnians produced 1,200 human casualties within a week. A second front that included local troops and South Korean bots soon broke out in Zaire. Most alarming, Steve Jobs announced that, due to a parts shortage, his long-awaited 12-terabyte iChip scalp implants would be delayed. The [Coltan War](#) was under way—and hitting Americans where they lived.

Chen and Rodriguez reacted to the conflict differently. Chen, ever the businessman, sought private-sector advice, turning to First China Banc's managing director for strategy, Hugo Chavez—a controversial choice, since some remembered Chavez as the former socialist president of Venezuela,

before he converted to capitalism "because the money [was] way better."

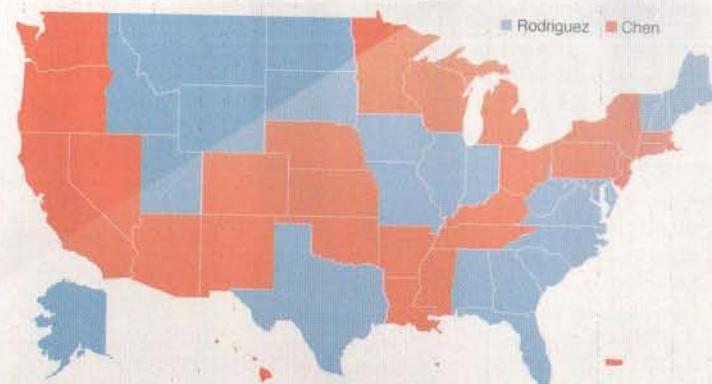
Rodriguez shored up her foreign policy bona fides with her July 4 selection of a running mate: Mark Danzig, the longtime US ambassador to the [Republic of Second Life](#). Rodriguez also pledged to name at least one cabinet secretary with late-stage

*Most alarming, Steve Jobs announced that his long-awaited 12-terabyte iChip scalp implants would be delayed.*

Alzheimer's, an obvious nod to boomers, who now comprise a remarkable 72 percent of voters.

Going into Labor Day, the race was a dead heat. It would all come down to the debate.

The candidates had agreed to just one prime-time meeting: October 12 in San Juan, capital of the newly admitted 52nd state, co-moderated by Anderson Cooper of the 24-hour Anderson Cooper Network and a hologram of Tom Brokaw [\[full transcript\]](#). Rodriguez was heavily favored, but the governor botched her response to Brokaw's question on gun rights for gay couples. Then, moments

**The 52-State Electoral Map**

&lt; 1 2 3 4 5 &gt;

**MELINDA GATES EXTENDS EX-HUBBY BILL'S MONTHLY ALLOWANCE BY \$30 MILLION ... NBA RESULTS: BKLY**



later, she said that US mobiletech interests could justify a troop deployment to the Bosnian Coltan Zone (BCZ)—contradicting a statement she made just two weeks earlier on the popular talk show *Nighttime With Ashton Kutcher*. Allegations that Rodriguez's daily *synaptic pharma-cocktail* had been tampered with were never confirmed.

But Chen's post-debate move was his most cunning: The next day, he ordered—and paid for—a private missile strike on Iranian military bases, telling Fox News, "The first one's on me." As few as 12 percent of voters reported knowing why the US might want to attack Iran. What mattered—and what the GOP candidate was counting on—was that the American people saw bombing, and they liked it. On November 5, 2024, Chen was elected the 47th president of the United States.

## Aftermath

Two days after the election, a remarkable DNA sample came to light. According to Huffington's Smoking Gun, it proved that the Reed Chen who had been campaigning for president since March 2023 was, in fact, a clone of Reed Chen. Indeed, it was not just one clone but two accelerated-age clones of a previous clone.

Rodriguez argued that her opponent should be disqualified on constitutional grounds since—accelerated aging notwithstanding—the clones had not reached the minimum age of 35. She also cited the fact that there were two of them.

The Chen camp did not dispute the DNA finding but dismissed it as irrelevant. The American people had made a clear choice for Reed Chen, however many of him there were.

Arguments in *Rodriguez v. Chen*<sup>2,3</sup> will be heard by the Supreme Court on Monday. Widespread blog-rioting and riot-blogging are expected. ☒☒☒

Back in 2008, Steve Bodow (steve@bodow.com) was head writer at The Daily Show With Jon Stewart.

## VLOG POSTS



**Jerry Business**

"I've known loads of clones in my day, and they've all been a bit off..."  
[\[watch\]](#)



**Frank R.**

"When will politicians stop trying to frighten us with false threats of Iranian infiltrators?"  
[\[watch\]](#)



**ZaZa**

"Let's be honest—the presidency stopped being the most important elected office in this country once the Supreme Court rejected Executive Privilege..."  
[\[watch\]](#)



**Sparky**

"Don't blame me—I voted for Bloomberg."  
[\[watch\]](#)



**Joannie T.**

"Whoever ends up winning, I'm moving to the Quebec Republic."  
[\[watch\]](#)

## RELATED VIDEO

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### Market Miscalculation

Glut in Clone Market Forces 2-for-1 Sales  
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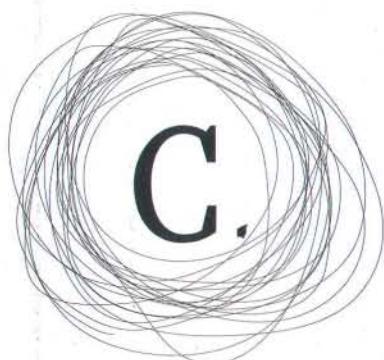


AMANDA BAGGS

is at the forefront of a movement that's forcing

YEAH,  
I'M

# A U T I S T I C.



*You got a problem with that?*

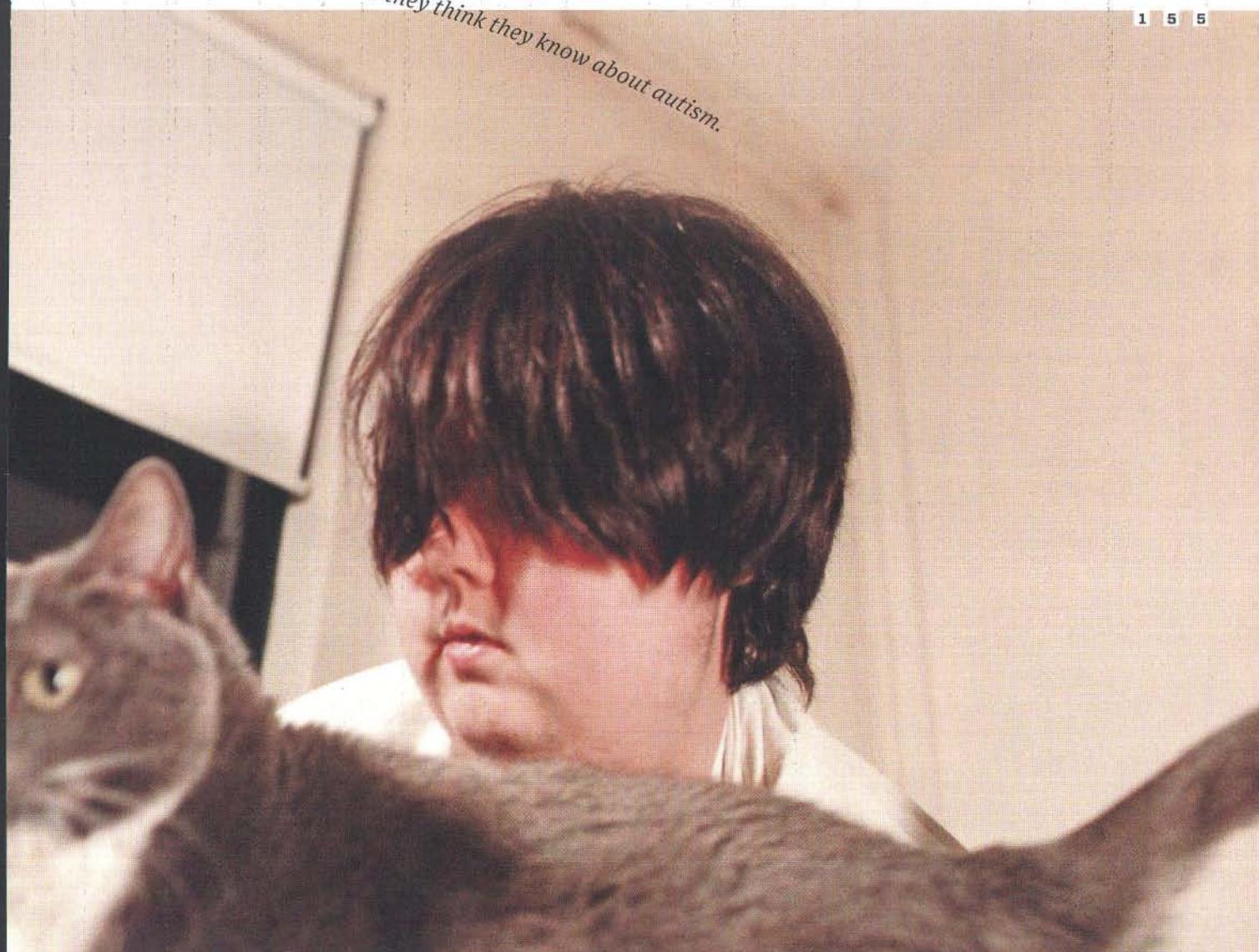
by DAVID WOLMAN



*scientists to reconsider what they think they know about autism.*

photographs by JESSICA DIMMOCK

1 5 5



THE YOUTUBE CLIP OPENS with a woman facing away from the camera, rocking back and forth, flapping her hands awkwardly, and emitting an eerie hum. She then performs strange repetitive behaviors: slapping a piece of paper against a window, running a hand lengthwise over a computer keyboard, twisting the knob of a drawer. She bats a necklace with her hand and nuzzles her face against the pages of a book. And you find yourself thinking: Who's shooting this footage of the handicapped lady, and why do I always get sucked into watching the latest viral video? ¶ But then the words "A Translation" appear on a black screen, and for the next five minutes, 27-year-old Amanda Baggs—who is autistic and doesn't speak—describes in vivid and articulate terms what's going on inside her head as she carries out these seemingly bizarre actions. In a synthesized voice generated by a software application, she explains that touching, tasting, and smelling allow her to have a "constant conversation" with her surroundings. These

forms of nonverbal stimuli constitute her “native language,” Baggs explains, and are no better or worse than spoken language. Yet her failure to speak is seen as a deficit, she says, while other people’s failure to learn her language is seen as natural and acceptable.

And you find yourself thinking: She might have a point.

Baggs lives in a public housing project for the elderly and handicapped near downtown Burlington, Vermont. She has short black hair, a pointy nose, and round glasses. She usually wears a T-shirt and baggy pants, and she spends a scary amount of time—day and night—on the Internet: blogging, hanging out in Second Life, and corresponding with her autie and aspie friends. (For the uninitiated, that’s *autistic and Asperger’s*.)

On a blustery afternoon, Baggs reclines on a red futon in the apartment of her neighbor (and best friend). She has a gray travel pillow wrapped around her neck, a keyboard resting on her lap, and a DynaVox VMax computer propped against her legs.

Like many people with autism, Baggs doesn’t like to look you in the eye and needs help with tasks like preparing a meal and taking a shower. In conversation she’ll occasionally grunt or sigh, but she stopped speaking altogether in her early twenties. Instead, she types 120 words a minute, which the DynaVox then translates into a synthesized female voice that sounds like a deadpan British schoolteacher.

The YouTube post, she says, was a political statement, designed to call attention to people’s tendency to underestimate autistics. It wasn’t her first video post, but this one took off. “When the number of viewers began to climb, I got scared out of my mind,” Baggs says. As the hit count neared 100,000, her blog was flooded. At 200,000, scientists were inviting her to visit their labs. By 300,000, the TV people came calling, hearts warmed by the story of a young woman’s fiery spirit and the rare glimpse into what has long been regarded as the solitary imprisonment of the autistic mind. “I’ve said a million times that I’m not ‘trapped in my own world,’” Baggs says. “Yet what do most of these news stories lead with? Saying exactly that.”

I tell her that I asked one of the world’s leading authorities on autism to check out the video. The expert’s opinion: Baggs must have had outside help creating it, perhaps from one of her caregivers. Her inability to talk, coupled with repetitive behaviors, lack of eye contact, and the need for assistance with everyday tasks are telltale signs of severe autism. Among all autistics, 75 percent are expected to score in the mentally retarded range on standard intelligence tests—that’s an IQ of 70 or less.

People like Baggs fall at one end of an array of developmental syndromes known as autism spectrum disorders. The spectrum ranges from someone with severe disability and cognitive impairment to the socially awkward eccentric with Asperger’s syndrome.

After I explain the scientist’s doubts, Baggs grunts, and her mouth forms just a hint of a smirk as she lets loose a salvo on the keyboard. No one helped her shoot the video, edit it, and upload it to YouTube. She used a Sony Cybershot DSC-T1, a digital camera that can record up to 90 seconds of video (she has since upgraded). She then patched the footage together using the editing programs RAD Video Tools,

VirtualDub, and DivXLand Media Subtitler. “My care provider wouldn’t even know how to work the software,” she says.

Baggs is part of an increasingly visible and highly networked community of autistics. Over the past decade, this group has benefited enormously from the Internet as well as innovations like type-to-speech software. Baggs may never have considered herself trapped in her own world, but thanks to technology, she can communicate with the same speed and specificity as someone using spoken language.

Autistics like Baggs are now leading a nascent civil rights movement. “I remember in ‘99,” she says, “seeing a number of gay pride Web sites. I envied how many there were and wished there was something like that for autism. Now there is.” The message: We’re here. We’re weird. Get used to it.

This movement is being fueled by a small but growing cadre of neuropsychological researchers who are taking a fresh look at the nature of autism itself. The condition, they say, shouldn’t be thought of as a disease to be eradicated. It may be that the autistic brain is not defective but simply different—an example of the variety of human development. These researchers assert that the focus on finding a cure for autism—the disease model—has kept science from asking fundamental questions about how autistic brains function.

A cornerstone of this new approach—call it the difference model—is that past research about autistic intelligence is flawed, perhaps catastrophically so, because the instruments used to measure intelligence are bogus. “If Amanda Baggs had walked into my clinic five years ago,” says Massachusetts General Hospital neuroscientist Thomas Zeffiro, one of the leading proponents of the difference model, “I would have said she was a low-functioning autistic with significant cognitive impairment. And I would have been totally wrong.”

**SEVENTY YEARS AGO**, a Baltimore psychiatrist named Leo Kanner began recording observations about children in his clinic who exhibited “fascinating peculiarities.” Just as Kanner’s landmark paper was about to be published, a pediatrician in Vienna named Hans Asperger was putting the finishing touches on a report about a similar patient population. Both men, independently, used the same word to describe and define the condition: *autist*, or *autism*, from the Greek *autos*, meaning self.

The children had very real deficits, especially when it came to the “failure to be integrated in a social group” (Asperger) or the inborn inability to form “affective contact” with other people (Kanner). The two doctors’ other observations about language impairment, repetitive behaviors, and the desire for sameness still form much of the basis of autism diagnoses in the 21st century.

On the matter of autistic intelligence, Kanner spoke of an array of mental skills, “islets of ability”—vocabulary, memory, and problem-solving that “bespeak good intelligence.” Asperger, too, was struck by “a particular originality of thought and experience.” Yet over the years, those islets attracted scientific interest only when they were amazing—savant-level capabilities in areas such as music, mathematics, and drawing. For the millions of people with autism who weren’t savants, the general view was that their condi-

*If Amanda Baggs had walked into my clinic five years ago,” says neuroscientist*

THOMAS ZEFFIRO,

*“I would have said she had*

tion was tragic, their brainpower lacking.

The test typically used to substantiate this view relies heavily on language, social interaction, and cultural knowledge—areas that autistic people, by definition, find difficult. About six years ago, Meredith Goldberg Edelson, a professor of psychology at Willamette University in Oregon, reviewed 215 articles published over the past 71 years, all making or referring to this link between autism and mental retardation. She found that most of the papers (74 percent) lacked their own research data to back up the assumption. Thirty-nine percent of the articles weren't based on any data, and even the more rigorous studies often used questionable measures of intelligence. "Are the majority of autistics mentally retarded?" Goldberg Edelson asks. "Personally, I don't think they are, but we don't have the data to answer that."

Mike Merzenich, a professor of neuroscience at UC San Francisco, says the notion that 75 percent of autistic people are mentally retarded is "incredibly wrong and destructive." He has worked with a number of autistic children, many of whom are nonverbal and would have been plunked into the low-functioning category. "We label them as retarded because they can't express what they know," and then, as they grow older, we accept that they "can't do much beyond sit in the back of a warehouse somewhere and stuff letters in envelopes."

The irony is that this dearth of data persists even as autism receives an avalanche of attention. Organizations such as Autism Speaks advocate for research and resources. Celebrity parents like Toni Braxton, Ed Asner, and Jenny McCarthy get high-profile coverage on talk shows and TV news magazines. Newsweeklies raise fears of an autism epidemic. But is there an epidemic? There's certainly the perception of one. According to the Centers for Disease Control, one out of every 150 8-year-old children (in the areas of the US most recently studied) has an autism spectrum disorder, a prevalence much higher than in decades past, when the rate was thought to be in the range of four or five cases per 10,000 children. But no one knows whether this apparent explosion of cases is due to an actual rise in autism, changing diagnostic criteria, inconsistent survey techniques, or some combination of the three.

In his original paper in 1943, Kanner wrote that while many of the children he examined "were at one time or another looked upon as feeble-minded, they are all unquestionably endowed with good cognitive potentialities." Sixty-five years later, though, little is known about those potentialities. As one researcher told me, "There's no money in the field for looking at differences" in the autistic brain. "But if you talk about trying to fix a problem—then the funding comes."

*significant cognitive impairment. And I would have been wrong.*

WRONG.



**N THE OUTSKIRTS** of Montreal sits a brick monolith, the Hôpital Rivière-des-Prairies. Once one of Canada's most notorious asylums, it now has a small number of resident psychiatric patients, but most of the space has been converted into clinics and research facilities.

One of the leading researchers here is Laurent Mottron, 55, a psychiatrist specializing in autism. Mottron, who grew up in postwar France, had a tough childhood. His family had a history of schizophrenia and Tourette syndrome, and he probably has what today

would be diagnosed as attention deficit and hyperactivity disorder. Naturally, he went into psychiatry. By the early '80s, Mottron was doing clinical work at a school in Tours that catered to children with sensory impairment, including autism. "The view then," Mottron says, "was that these children could be reeled back to normalcy with play therapy and work on the parents' relationships"—a gentle way of saying that the parents, especially the mother, were to blame. (The theory that emotionally distant "refrigerator mothers" caused autism had by then been rejected in the US, but in France and many other countries, the view lingered.)

After only a few weeks on the job, Mottron decided the theories were crap. "These children were just of another kind," he says. "You couldn't turn someone autistic or make someone not autistic. It was hardwired." In 1986, Mottron began working with an autistic man who would later become known in the scientific literature as "E.C." A draftsman who specialized in mechanical drawings, E.C. had incredible savant skills in 3-D drawing. He could rotate objects in his mind and make technical drawings without the need for a single revision. After two years of working with E.C., Mottron made his second breakthrough—not about autistics this time but about the rest of us: People with standard-issue brains—so-called neurotypicals—don't have the perceptual abilities to do what E.C. could do. "It's just inconsistent with how our brains work," Mottron says.

From that day forward, he decided to challenge the disease model underlying most autism research. "I wanted to go as far as I could to show that their perception—their brains—are totally different." Not damaged. Not dysfunctional. Just different.

By the mid-1990s, Mottron was a faculty member at the University of Montreal, where he began publishing papers on "atypicalities of perception" in autistic subjects. When performing certain mental tasks—especially when tapping visual, spatial, and auditory functions—autistics have shown superior performance compared with neurotypicals. Call it the upside of autism. Dozens of studies—Mottron's and others—have demonstrated that people with autism spectrum disorder have a number of strengths: a higher prevalence of perfect pitch, enhanced ability with 3-D drawing and pattern recognition, more accurate graphic recall, and various superior memory skills.

Yet most scientists who come across these skills classify them as "anomalous peaks of ability," set them aside, and return to the questions that drive most research: What's wrong with the autistic brain? Can we find the genes responsible so that we can someday cure it? Is there a unifying theory of autism? With severe autistics, cognitive strengths are even more apt to be overlooked because these indi-



*"To a remarkable degree, scientists continue to use*

viduals have such obvious deficits and are so hard to test. People like Baggs don't speak, others may run out of the room, and still others might not be able to hold a pencil. And besides, if 75 percent of them are mentally retarded, well, why bother?

Mottron draws a parallel with homosexuality. Until 1974, psychiatry's bible, the *Diagnostic and Statistical Manual of Mental Disorders*, described being gay as a mental illness. Someday, Mottron says, we'll look back on today's ideas about autism with the same sense of shame that we now feel when talking about psychology's pre-1974 views on sexuality. "We want to break the idea that autism should definitely be suppressed," he says.

**I**CHÉLLE DAWSON doesn't drive or cook. Public transit overwhelms her, and face-to-face interaction is an ordeal. She was employed as a postal worker in 1998 when she "came out of the closet" with her diagnosis of autism, which she received in the early '90s. After that, she claims, Canada Post harassed her to such a degree that she was forced to take a permanent leave of absence, starting in 2002. (Canada Post says Dawson was treated fairly.) To

fight back, she went on an information-devouring rampage. "There's such a variety of human behavior. Why is my kind wrong?" she asks. She eventually began scouring the libraries of McGill University in Montreal to delve into the autism literature. She searched out journal articles using the online catalog and sat on the floor reading studies among the stacks.

Dawson, like Baggs, has become a reluctant spokesperson for this new view of autism. Both are prolific bloggers and correspond constantly with scientists, parents' groups, medical institutions, the courts, journalists, and anyone else who'll listen to their stories of how autistics are mistreated. Baggs has been using YouTube to make her point; Dawson's weapon is science.

In 2001, Dawson contacted Mottron, figuring that his clinic might help improve the quality of her life. Mottron tried to give her some advice on navigating the neurotypical world, but his tips on how to handle banking, shopping, and buses didn't help. After meeting with her a few times, Mottron began to suspect that what Dawson really needed was a sense of purpose. In 2003, he handed her one of his in-progress journal articles and asked her to copyedit the grammar. So Dawson started reading. "I criticized his science almost immediately," she says.

Encouraged by Dawson's interest, Mottron sent her other papers. She responded with written critiques of his work. Then one day in early 2003, she called with a question. "I asked: 'How did they con-

trol for attention in that fMRI face study?' That caught his attention." Dawson had flagged an error that Mottron says most postdocs would have missed. He was impressed, and over the next few months he sought Dawson's input on other technical questions. Eventually, he invited her to collaborate with his research group, despite the fact that her only academic credential was a high school diploma.

Dawson has an incredible memory, but she's not a savant. What makes her unique, Mottron says, is her gift for scientific analysis—the way she can sniff through methodologies and statistical manipulation, hunting down tiny errors and weak links in logic.

Last summer, the peer-reviewed journal *Psychological Science* published a study titled "The Level and Nature of Autistic Intelligence." The lead author was Michelle Dawson. The paper argues that autistic smarts have been underestimated because the tools for assessing intelligence depend on techniques ill-suited to autistics. The researchers administered two different intelligence tests to 51 children and adults diagnosed with autism and to 43 non-autistic children and adults.

The first test, known as the Wechsler Intelligence Scale, has helped solidify the notion of peaks of ability amid otherwise pervasive mental retardation among autistics. The other test is Raven's Progressive Matrices, which requires neither a race against the clock nor a proctor breathing down your neck. The Raven is considered as reliable as the Wechsler, but the Wechsler is far more commonly used. Perhaps that's because it requires less effort for the average test taker. Raven measures abstract reasoning—"effortful" operations like spotting patterns or solving geometric puzzles. In contrast, much of the Wechsler assesses crystallized skills like acquired vocabulary, making correct change, or knowing that milk goes in the fridge and cereal in the cupboard—learned information that most people intuit or recall almost automatically.

What the researchers found was that while non-autistic subjects scored just about the same—a little above average—on both tests, the autistic group scored much better on the Raven. Two individuals' scores swung from the mentally retarded range to the 94th percentile. More significantly, the subset of autistic children in the study scored roughly 30 percentile points higher on the Raven than they did on the more language-dependent Wechsler, pulling all but a couple of them out of the range for mental retardation.

A number of scientists shrugged off the results—of course autistics would do better on nonverbal tests. But Dawson and her coauthors saw something more. The "peaks of ability" on the Wechsler correlated strongly with the average scores on the Raven. The finding suggests the Wechsler scores give only a glimpse of the autistics' intelligence, whereas the Raven—the gold standard of



Michelle Dawson, right, is autistic. She's also a researcher in the lab of Laurent Mottron (left), a psychiatrist who specializes in autism.

Yet to a remarkable degree, scientists conducting cognitive evaluations continue to use tests which presume that people who can't communicate the answer don't know the answer. The question is: Why? Greg Allen, an assistant professor of psychiatry at University of Texas Southwestern Medical Center, says that although most researchers know the Wechsler doesn't provide a good assessment of people with autism, there's pressure to use the test anyway. "Say you're submitting a grant to study autistic people by comparing them to a control group," he says. "The first question that comes up is: Did you control for IQ? Matching people on IQ is meant to clean up the methodology, but I think it can also end up damaging the study."

And that hurts autistic people, Dawson says. She makes a com-

fluid intelligence testing—reveals the true, or at least truer, level of general intelligence.

parison with blindness. Of course blind people have a disability and need special accommodation. But you wouldn't give a blind person a test heavily dependent on vision and interpret their poor score as an accurate measure of intelligence. Mottron is unequivocal: Because of recent research, especially the Raven paper, it's clearer than ever that so-called low-functioning people like Amanda Baggs are more intelligent than once presumed.

The Dawson paper was hardly conclusive, but it generated buzz among scientists and the media. Mottron's team is now collaborating with Massachusetts General Hospital's Zeffiro, a neuroimaging expert, to dig deeper. Zeffiro and company are looking for variable types of mental processing *without* asking, what's wrong with this brain? Their first study compares fMRI results from autistic and control subjects whose brains were imaged while they performed the Raven test. The group is currently crunching numbers for publication, and the study looks both perplex-

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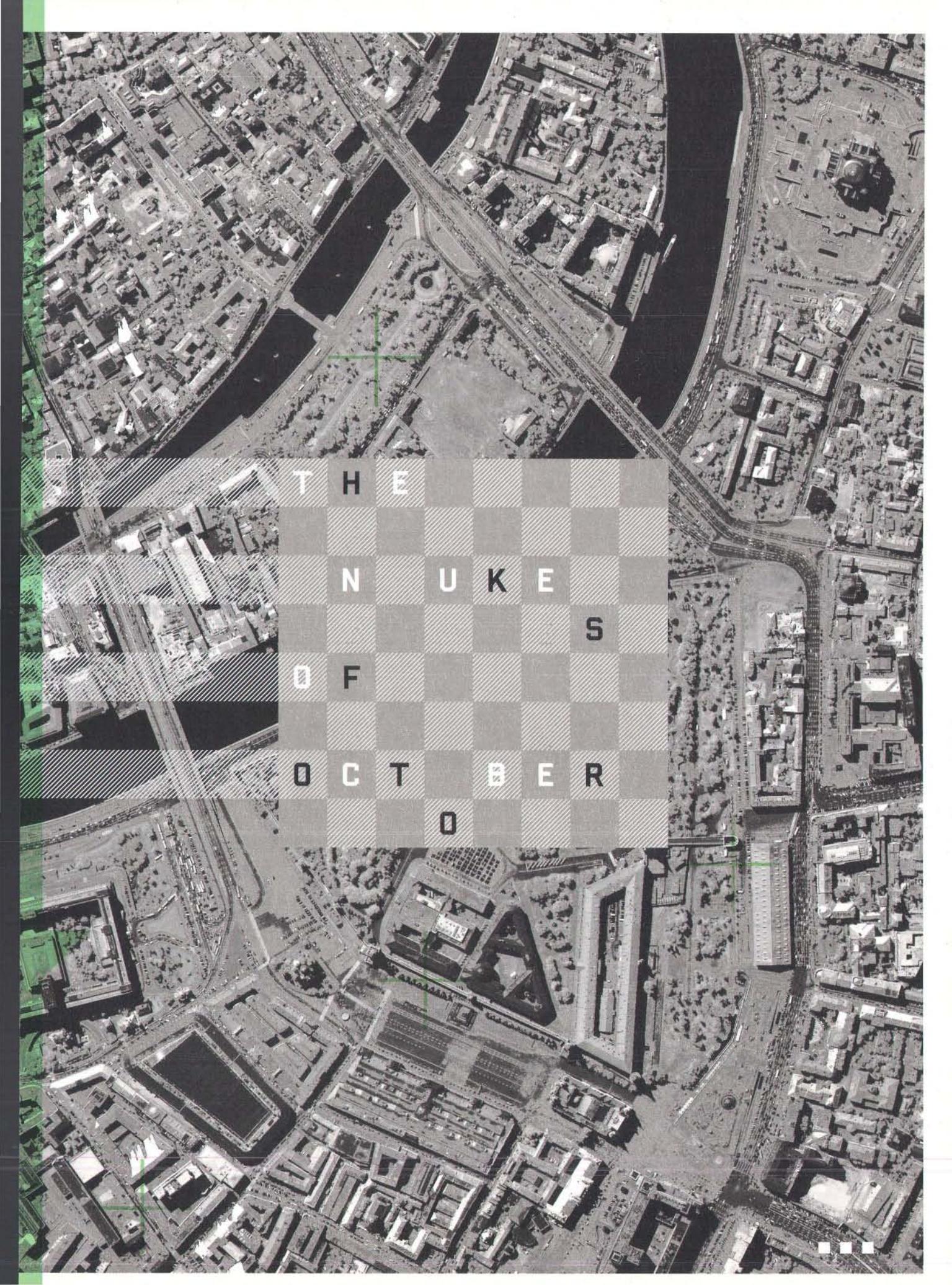


RICHARD NIXON AND HENRY KISSINGER HAD A SECRET PLAN

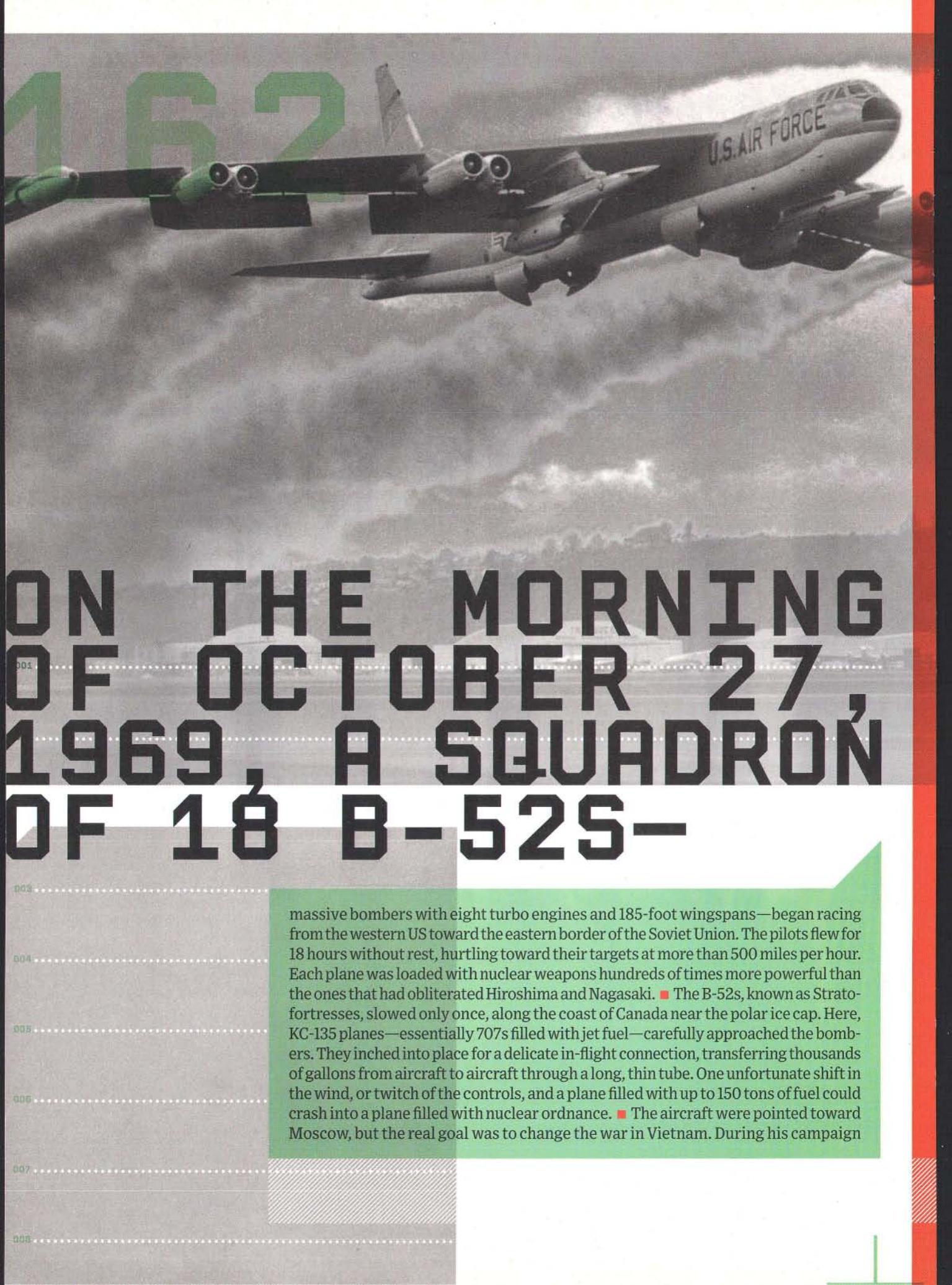
TO BRING PEACE TO VIETNAM:

APPEAR UNSTABLE—AND PRETEND TO LAUNCH A NUCLEAR ATTACK.

BY JEREMI SURI

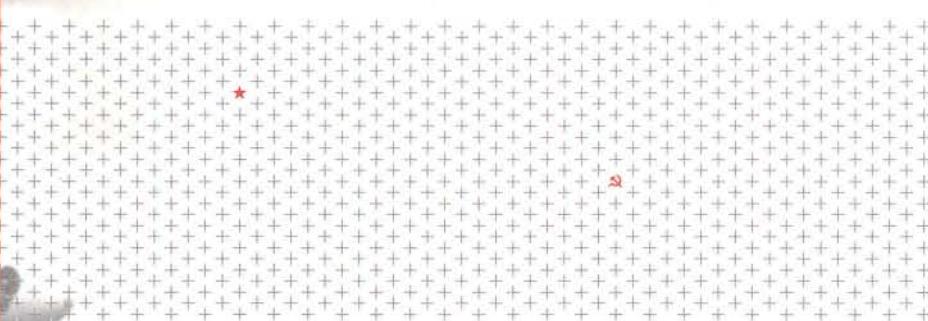


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# ON THE MORNING OF OCTOBER 27, 1969, A SQUADRON OF 18 B-52S—

massive bombers with eight turbo engines and 185-foot wingspans—began racing from the western US toward the eastern border of the Soviet Union. The pilots flew for 18 hours without rest, hurtling toward their targets at more than 500 miles per hour. Each plane was loaded with nuclear weapons hundreds of times more powerful than the ones that had obliterated Hiroshima and Nagasaki. ■ The B-52s, known as Stratofortresses, slowed only once, along the coast of Canada near the polar ice cap. Here, KC-135 planes—essentially 707s filled with jet fuel—carefully approached the bombers. They inched into place for a delicate in-flight connection, transferring thousands of gallons from aircraft to aircraft through a long, thin tube. One unfortunate shift in the wind, or twitch of the controls, and a plane filled with up to 150 tons of fuel could crash into a plane filled with nuclear ordnance. ■ The aircraft were pointed toward Moscow, but the real goal was to change the war in Vietnam. During his campaign



for the presidency the year before, Richard Nixon had vowed to end that conflict. But more than 4,500 Americans had died there in the first six months of 1969, including 84 soldiers at the debacle of Hamburger Hill. Meanwhile, the peace negotiations in Paris, which many people hoped would end the conflict, had broken down. The Vietnamese had declared that they would just sit there, conceding nothing, "until the chairs rot." Frustrated, Nixon decided to try something new: threaten the Soviet Union with a massive nuclear strike and make its leaders think he was crazy enough to go through with it. His hope was that the Soviets would be so frightened of events spinning out of control that they would strong-arm Hanoi, telling the North Vietnamese to start making concessions at the negotiating table or risk losing Soviet military support.

Codename Giant Lance, Nixon's plan was the culmination of a strategy of premeditated madness he had developed with national security adviser Henry Kissinger. The details of this episode remained secret for 35 years and have never been fully told. Now, thanks to documents released through the Freedom of Information Act, it's clear that Giant Lance was the leading example of what historians came to call the "madman theory": Nixon's notion that faked, finger-on-the-button rage could bring the Soviets to heel.

Nixon and Kissinger put the plan in motion on October 10, sending the US military's Strategic Air Command an urgent order to prepare for a possible confrontation: They wanted the most powerful thermonuclear weapons in the US arsenal readied for immediate use against the Soviet Union. The mission was so secretive that even senior military officers following the orders—including the SAC commander himself—were not informed of its true purpose.

Two weeks later, the plans were set and teams of workers at Air Force bases in Washington state and Southern California began to prepare for battle—loading the heavy and cumbersome weapons in a frenetic fashion. The workers were pushed beyond their training, and there could have been an accidental explosion. There had been near-disasters before. Just a year earlier, a Stratofortress had crashed in Greenland and released radioactive material.

After their launch, the B-52s pressed against Soviet airspace for three days. They skirted enemy territory, challenging defenses and taunting Soviet aircraft. The pilots remained on alert, prepared to drop their bombs if ordered. The Soviets likely knew about the threat as it was unfolding: Their radar picked up the planes early in their flight paths, and their spies monitored American bases. They knew the bombers were armed with nuclear weapons, because they could determine their weight from takeoff patterns and fuel use. In past years, the US had kept nuclear-armed planes in the air as a possible deterrent (if the Soviets blew up all of our air bases in a surprise attack, we'd still be able to respond). But in 1968, the Pentagon publicly banned that practice—so the Soviets

wouldn't have thought the 18 planes were part of a patrol. Secretary of defense Melvin Laird, who opposed the operation, worried that the Soviets would either interpret Giant Lance as an attack, causing catastrophe, or as a bluff, making Washington look weak.

The US had come perilously close to nuclear war before: During the Cuban Missile Crisis in 1962, the nation's nuclear forces were poised for imminent use in response to Soviet actions. And on several occasions, aircraft carrying nuclear weapons had crashed; other times, radar operators had misinterpreted flocks of migrating birds as a Soviet first strike. October 1969, however, was different. This was the only moment we know of when a president decided that it made strategic sense to pretend to launch World War III.

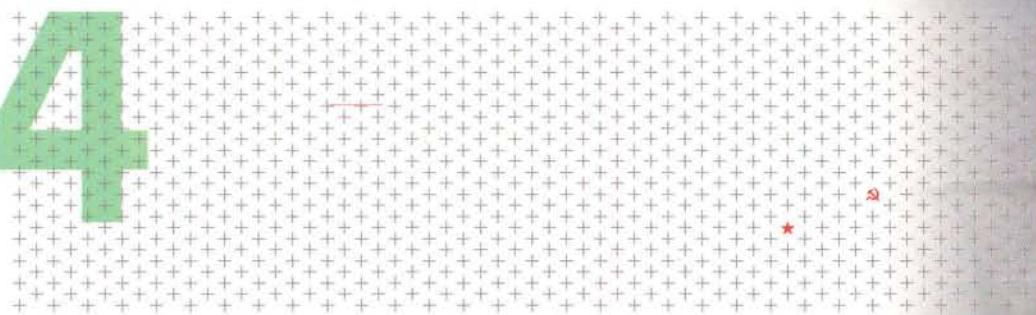
**NIXON'S MADMAN POSE** and Giant Lance were based on game theory, a branch of mathematics that uses simple calculations and rigorous logic to help understand how people make choices—like whether to surge ahead in traffic or whether to respond to a military provocation with a strike of one's own. The most famous example in the field is the Prisoner's Dilemma: If two criminal suspects are held in separate cells, should they keep mum or rat each other out? (Answer: They should keep quiet, but as self-interested actors, what they will do is betray each other and both go to jail.) In the Cold War, the "games" were much more complicated simulations of war and bargaining: Would the Soviets be more likely to attack Western Europe if we kept missiles there or if we didn't?

Kissinger had studied game theory as a young academic and strategic theorist at Harvard. In the early '60s, he was part of a group of World War II veterans who became the oracles or "whiz kids" of the nuclear age. Working at newly formed institutes and think tanks, like the RAND Corporation, they preached that the proper way to deal with the existence of nuclear weapons wasn't to act as if the situation was so grave that one couldn't even discuss using them; it was to figure out how to use them most effectively. This was the attitude mocked by Stanley Kubrik in *Dr. Strangelove*, in which RAND appears thinly disguised as the Bland Corporation.

One of the starting points for Cold War game theory was President Eisenhower's proposed doctrine of "massive retaliation": Washington would respond viciously to any attack on the US or its allies. This, the thinking went, would create enough fear to deter enemy aggression. But Kissinger believed this policy could actually encourage our enemies and limit our power. Would the US really nuke Moscow if the Soviets funded some communist insurgents in Angola or took over a corner of Iran? Of course not. As a result, enemies would engage in "salami tactics," slicing away at American interests, confident that the US would not respond.

The White House needed a wider range of military options. More choices, the thinking went, would allow us to prevent some con-

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flicts from starting, gain bargaining leverage in others, and stop still others from escalating. This game-theory logic was the foundation for what became in the '60s and '70s the doctrine of "flexible response": Washington would respond to small threats in small ways and big threats in big ways.

The madman theory was an extension of that doctrine. If you're going to rely on the leverage you gain from being able to respond in flexible ways—from quiet nighttime assassinations to nuclear reprisals—you need to convince your opponents that even the most extreme option is really on the table. And one way to do that is to make them think you are crazy.

Consider a game that theorist Thomas Schelling described to his students at Harvard in the '60s: You're standing at the edge of a cliff, chained by the ankle to another person. As soon as one of you cries uncle, you'll both be released, and whoever remained silent will get a large prize. What do you do? You can't push the other person off the cliff, because then you'll die, too. But you can dance and walk closer and closer to the edge. If you're willing to show that you'll brave a certain amount of risk, your partner may concede—and you might win the prize. But if you convince your adversary that you're crazy and liable to hop off in any direction at any moment, he'll probably cry uncle immediately. If the US appeared reckless, impatient, even insane, rivals might accept bargains they would have rejected under normal conditions. In terms of game theory, a new equilibrium would emerge as leaders in Moscow, Hanoi, and Havana contemplated how terrible things could become if they provoked an out-of-control president to experiment with the awful weapons at his disposal.

The nuclear-armed B-52 flights near Soviet territory appeared to be a direct application of this kind of game theory. H. R. Haldeman, Nixon's chief of staff, wrote in his diary that Kissinger believed evidence of US irrationality would "jar the Soviets and North Vietnam." Nixon encouraged Kissinger to expand this approach. "If the Vietnam thing is raised" in conversations with Moscow, Nixon advised,

Kissinger should "shake his head and say, 'I am sorry, Mr. Ambassador, but [the president] is out of control.' Nixon told Haldeman: 'I want the North Vietnamese to believe that I've reached the point that I might do anything to stop the war. We'll just slip the word to them that 'for God's sake, you know Nixon is obsessed about Communism. We can't restrain him when he is angry—and he has his hand

on the nuclear button'—and Ho Chi Minh himself will be in Paris in two days begging for peace."

**AS GIANT LANCE** unfolded, Soviet general secretary Leonid Brezhnev had no way of knowing whether this was an exercise, a bluff, or the attack that would end it all (and to which he needed to respond in kind immediately). Brezhnev's ambassador to the US, Anatoly Dobrynin, urgently set up a meeting with Nixon and Kissinger.

Dobrynin began the conversation by expressing alarm about White House actions. The president then lashed out at the Soviet ambassador, demanding that Moscow help the US in Vietnam. Nixon declared that if help wasn't given, "the United States reserves the right to go its own way and to use its own methods to end the war."

Dobrynin explained that the Soviet leadership understood Nixon and Kissinger's threat that "the United States may resort to some 'other measures' to resolve the Vietnam issue." But in that case, Dobrynin continued, "Moscow would like to tell the president bluntly that the policy of settling the Vietnam issue through military force is not only futile but extremely dangerous."

Dobrynin recounted Nixon's threatening words in his report to the Kremlin: The president said "he will never (Nixon twice emphasized that word) accept a humiliating defeat or humiliating terms. The US, like the Soviet Union, is a great nation, and he is its president. The Soviet leaders are determined persons, but he, the president, is the same."

Dobrynin warned Soviet leaders that "Nixon is unable to control himself even in a conversation with a foreign ambassador." He also commented on the president's "growing emotionalism" and "lack of balance."

This was exactly the impression that Nixon and Kissinger had sought to cultivate. After the meeting, Kissinger reveled in their success. He wrote the president: "I suspect Dobrynin's basic mission was to test the seriousness of the threat." Nixon had, according to Kissinger, "played it very cold with Dobrynin, giving him one back for each he dished out." Kissinger counseled the White House to "continue backing up our verbal warnings with our present military moves."

**ON OCTOBER 30**, Nixon and Kissinger ordered an end to Giant Lance, and the B-52s turned and headed back home. The sudden conclusion reinforced the madman pose. Nixon and Kissinger may have been trying to show the Soviets that they could initiate threatening actions without warning and then restore "normal" operations in similarly unpredictable ways. This would keep the Kremlin guessing about what was coming next, wondering whether the US would soon send both countries off the cliff.

On the most obvious level, the mission failed. It may have scared

► SOVIET PREMIER LEONID BREZHNEV





## KISSINGER HAD STUDIED GAME THEORY AND BELIEVED THAT NUCLEAR WEAPONS WERE USELESS—UNLESS YOUR ENEMY BELIEVED YOU WERE CRAZY ENOUGH TO ACTUALLY LAUNCH THEM.

the Soviets, but it did not compel them to end their support for Hanoi, and the North Vietnamese certainly didn't dash to Paris to beg for peace. Nixon and Kissinger believed, though, that their threats opened the door to the arms-control deals of the early '70s. According to this argument, leaders in Moscow recognized after October 1969 that they had better negotiate with Washington, on terms amenable to American interests.

More than 35 years after Giant Lance, I asked Kissinger about it during a long lunch at the Four Seasons Grill in New York. Why, I asked, did they risk nuclear war back in October 1969? He paused over his salad, surprised that I knew so much about this episode, and measured his words carefully. "Something had to be done," he explained, to back up threats the US had made and to push the Soviets for help in Vietnam. Kissinger had suggested the nuclear maneuvers to give the president more leverage in negotiations. It

was an articulation of the game theory he had studied before coming to power. "What were [the Soviets] going to do?" Kissinger said dismissively.

But what if things had gone terribly wrong—if the Soviets had overreacted, if a B-52 had crashed, if one of the hastily loaded warheads had exploded? Kissinger demurred. Denying that there was ever a madman theory in operation, he emphasized that Giant Lance was designed to be a warning, not a provocation to war. The operation was designed to be safe. And in any case, he said, firm resolve is essential to policymaking. □

**JEREMI SURI** (suri@wisc.edu), a history professor at the University of Wisconsin, is the author of *Henry Kissinger and the American Century*. To see original documents upon which this story is based, go to [wired.com/extras](http://wired.com/extras).



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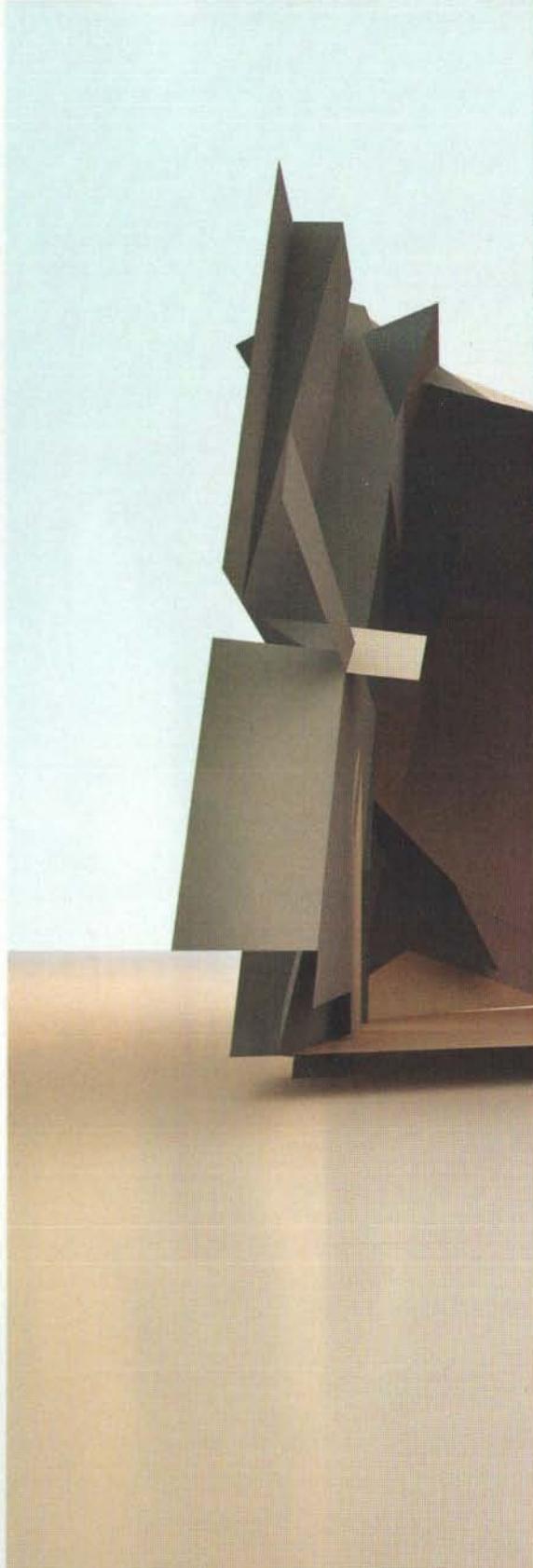
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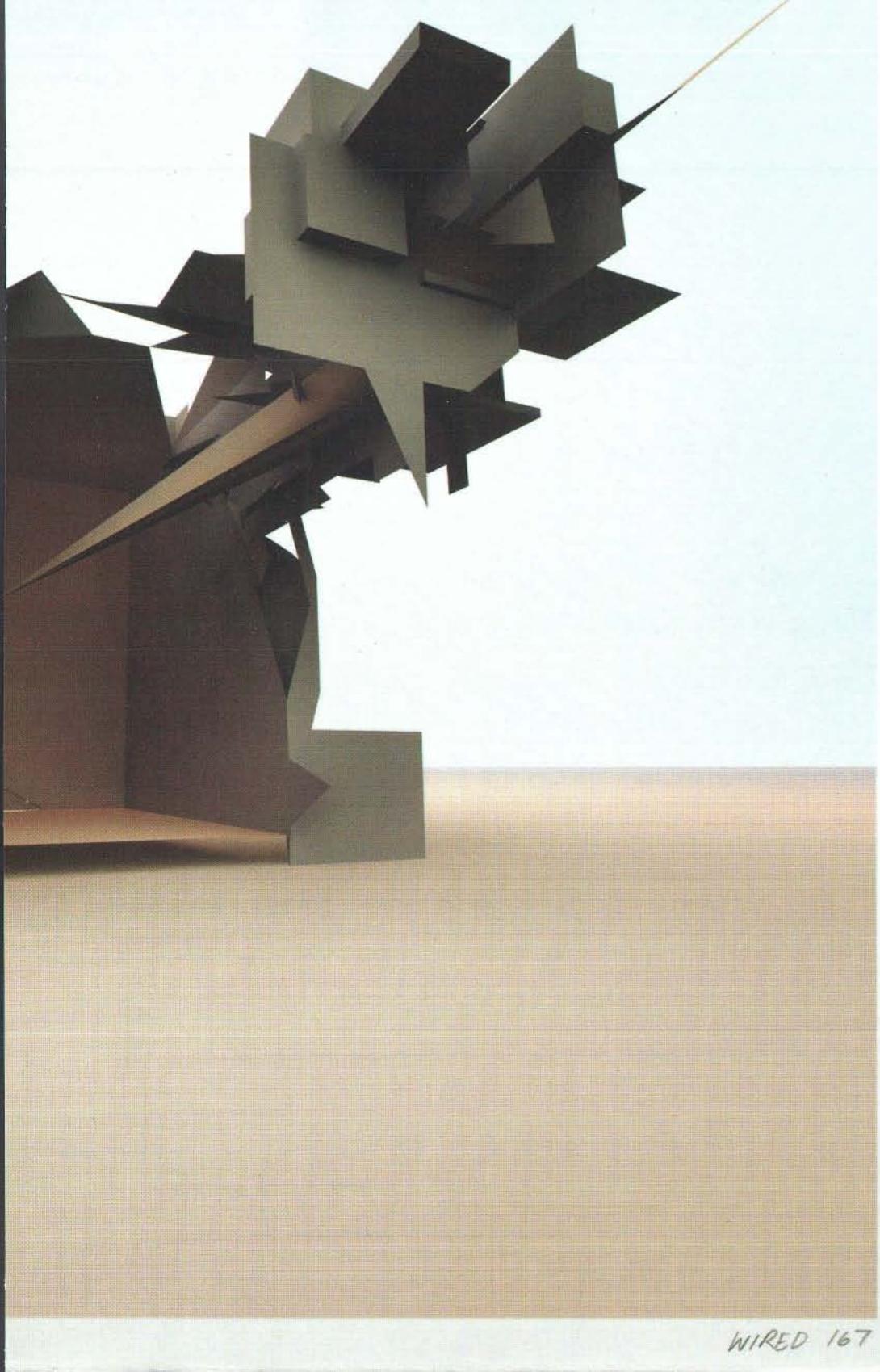
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**Don't delete that spam! It could be art. These data-crunching artists transform the world of information into mesmerizing abstractions.**

↑ BLOG POSTS, traffic patterns, government reports, digital video, email—a new crop of artists are using data in much the same way Picasso applied paint. Take Jason Salavon, who harnesses the information in US census reports to create undulating ribbons of color. Or Aaron Koblin, whose art supplies include things like airline flight paths and doodles by 10,000 strangers. These so-called generative artists transform this raw data into sharp visual statements with programs like Processing, an open source electronic sketchbook, and VVVV, which can merge audio, video, and 3-D models. The results are sweet, but they're not just eye candy: They deliver a fresh perspective on the digital detritus we humans shed—or acquire—as we inhabit the virtual world.





## Alex Dragelescu

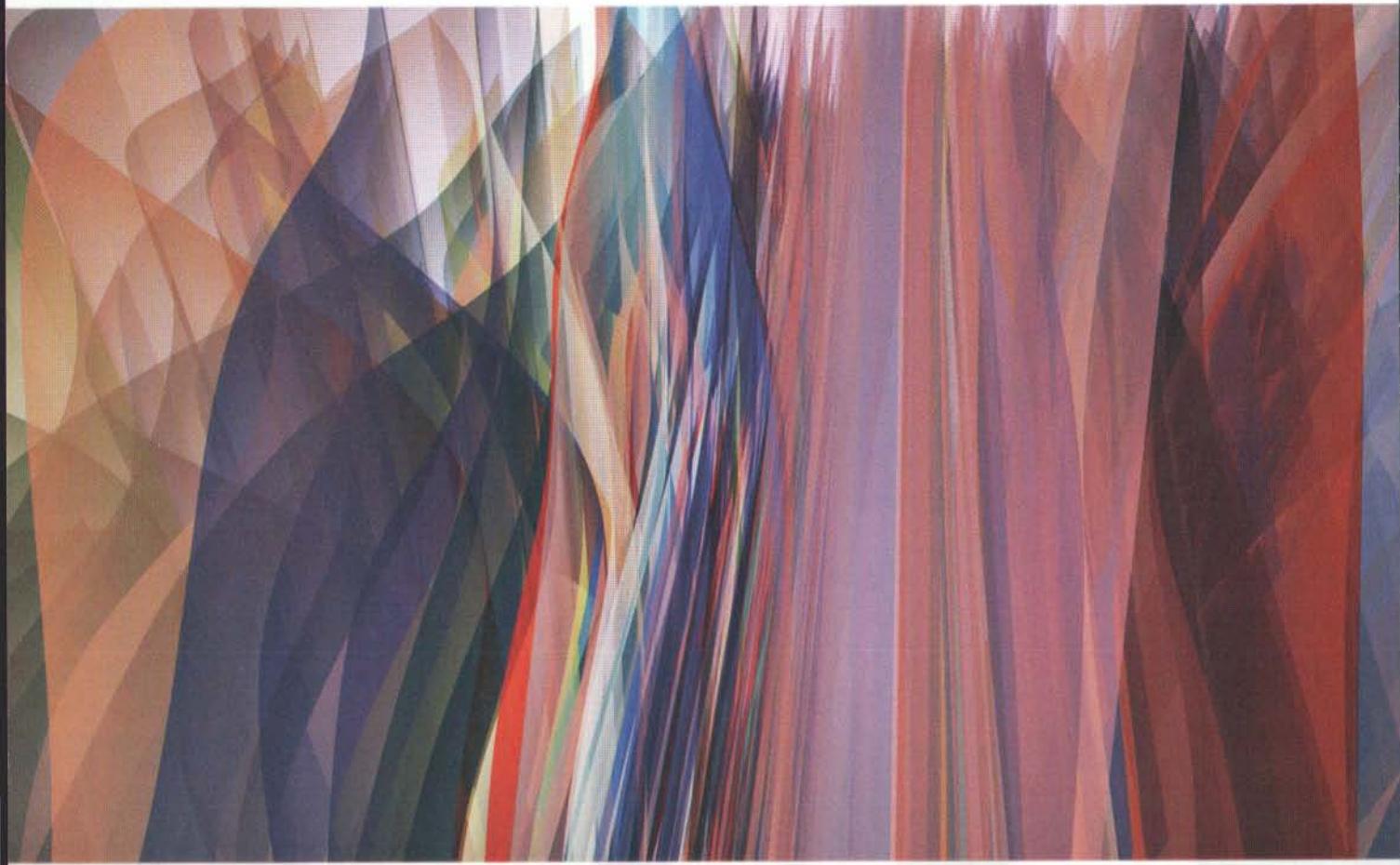
PROJECT  
**Spam Architecture**

DATA SET  
**Junk email**

SOFTWARE  
**Maya, Mel, PHP**

LAST EXHIBITED  
**TodaysArt Festival, The Hague, Netherlands (2007)**

Dragelescu presses the spam he receives into service as a blueprint for digital sculptures: First a script breaks the message into chunks of text he calls tokens. Each token is assigned a value (based on the sum of its characters), which triggers different modeling operations—adding elements to the structure, shifting pieces around, and blowing the thing apart. "I am very much like artists who appropriate manufactured or existing objects," Dragelescu says. "Spam is found, discarded, abject data that can be mutated, recycled, and transformed."



## Aaron Koblin

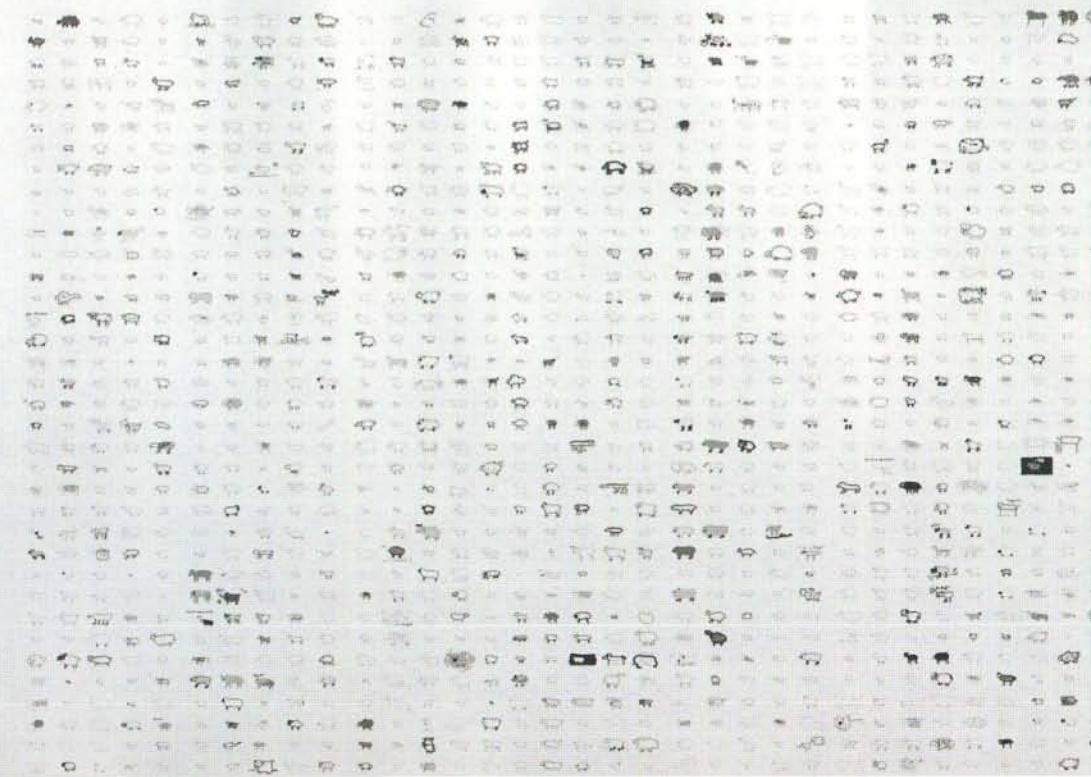
PROJECT  
**The Sheep Market**

DATA SET  
**Digital drawings**

SOFTWARE  
**Mechanical Turk,**  
**Processing**

LAST EXHIBITED  
**LABoral Centro de Arte,**  
**Gijon, Spain (2007)**

To create this phalanx of 10,000 sheep, all drawn by random strangers, Koblin turned to Amazon.com's Mechanical Turk, where Web surfers receive a small fee to perform tasks. Koblin provided a Processing-based drawing tool and promised 2 cents per left-facing ovine, and the crowd got to work. "I wanted to raise questions about the emergence of new labor systems in the information age," Koblin says.





## Jason Salavon

PROJECT  
**American Varietal**

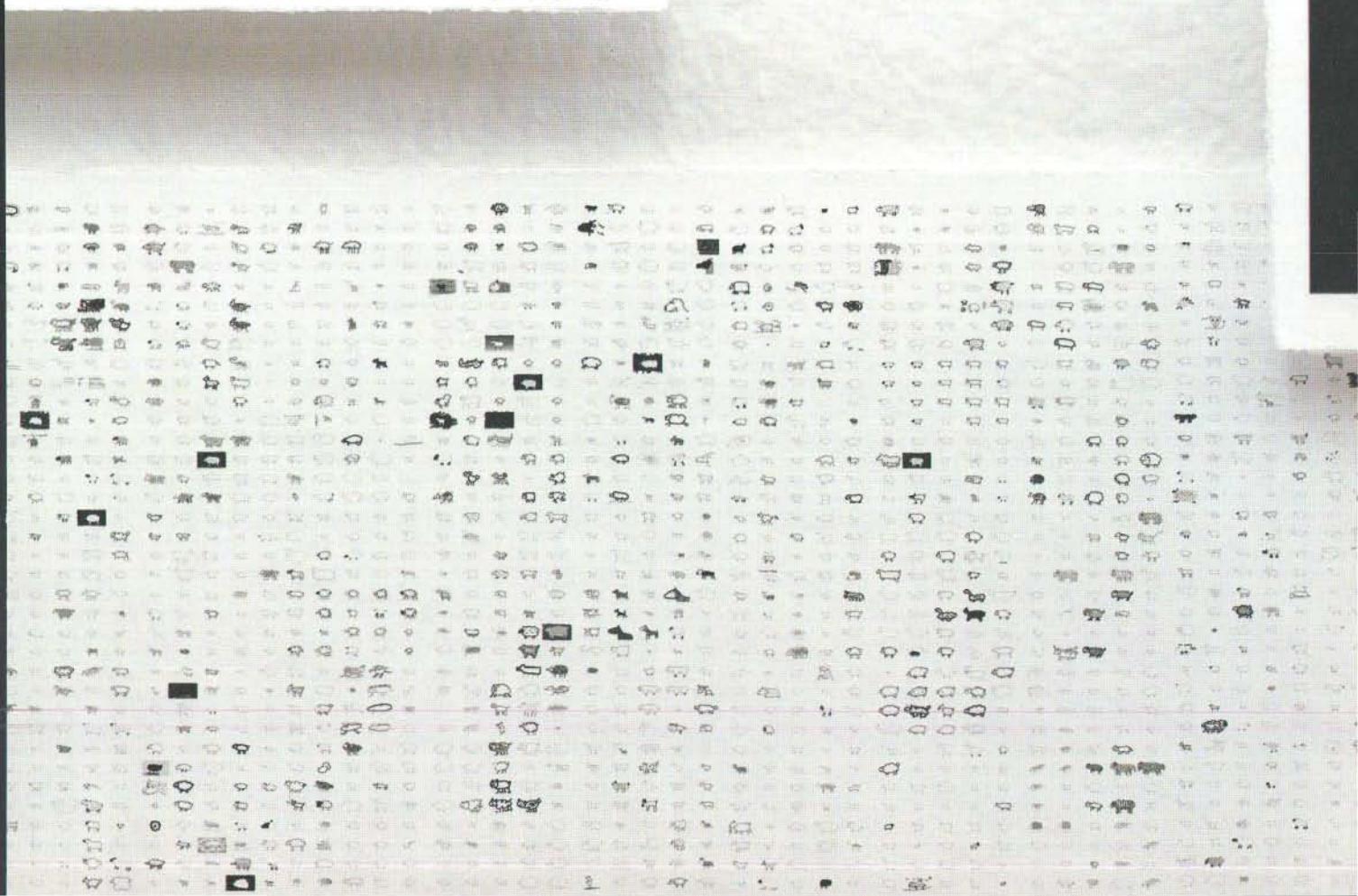
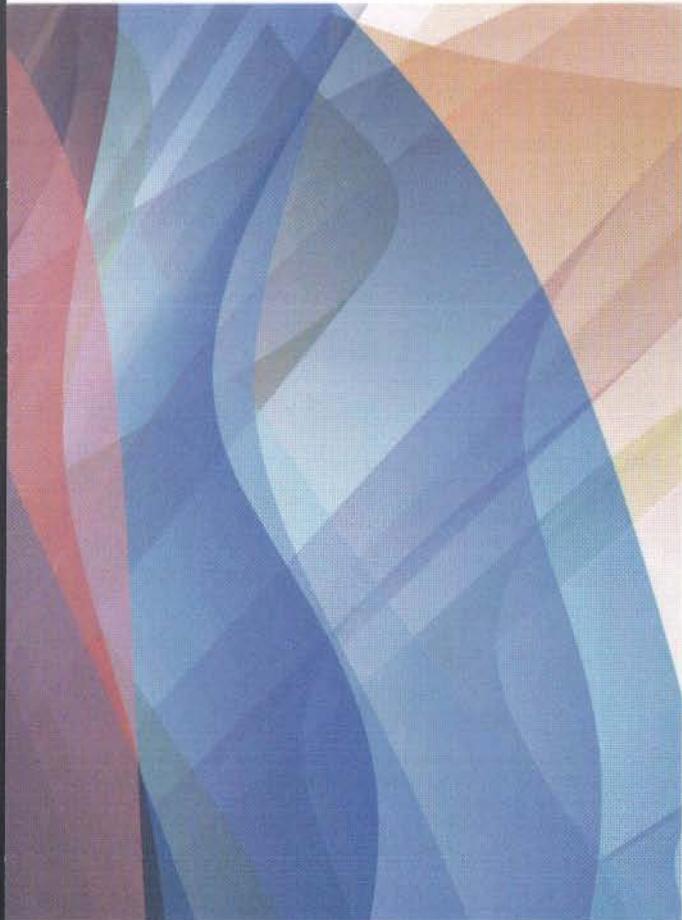
DATA SET  
**US population  
by county, 1790-2000**

SOFTWARE  
**C, Maya**

UPCOMING PERMANENT  
INSTALLATION  
**US Census Bureau,  
Suitland, Maryland  
(2008)**

Salavon crunched mountains of US census data with code written in C and fed it all into Maya to craft sinuous ribbons representing the population of every US county over the course of more than 200 years. "There are narratives in this data," he says. "There are millions of stories about individuals and their travels across the country over time. I wanted to translate those into pure abstraction."

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## Paul Prudence

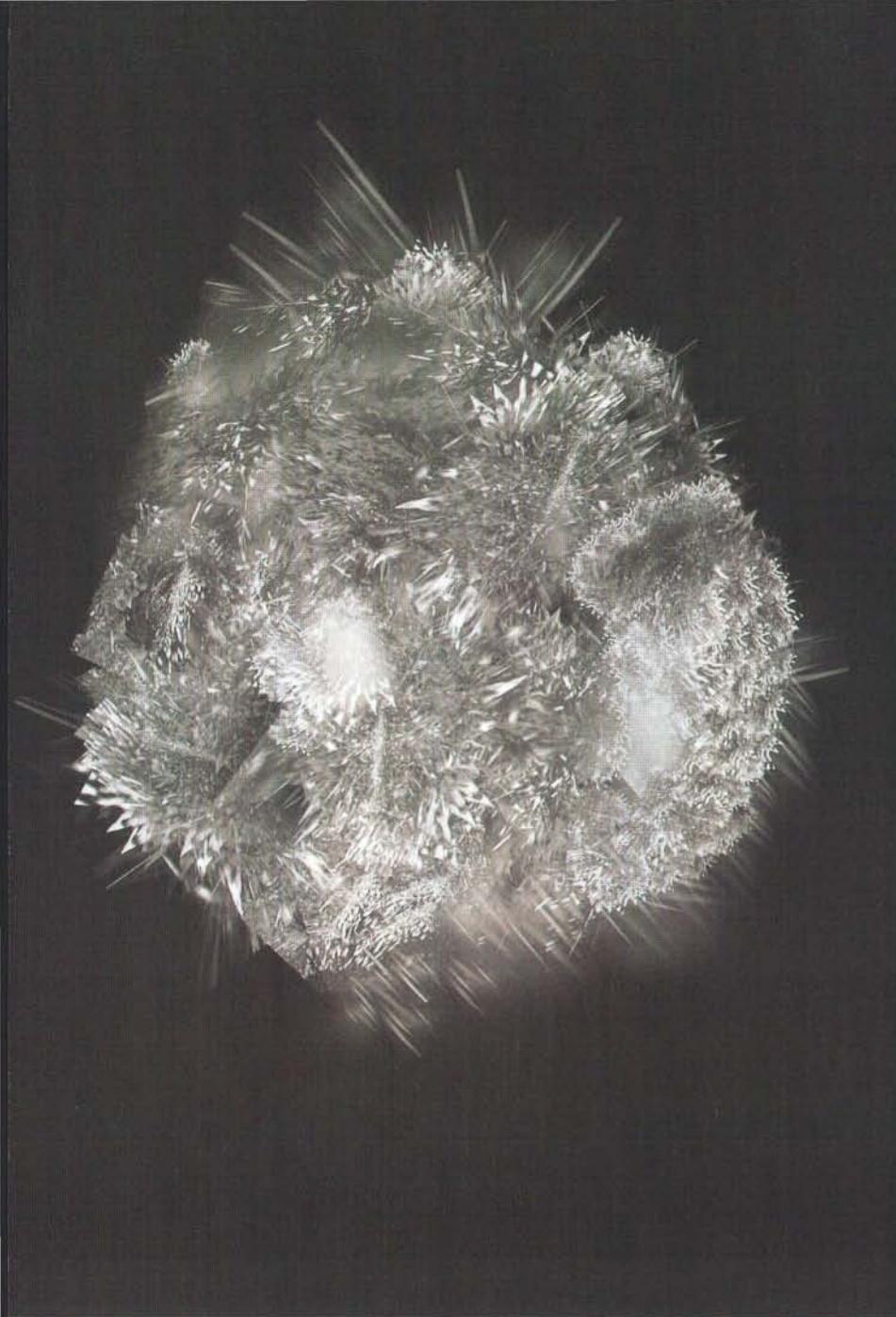
PROJECT  
**Daub**

DATA SET  
[Online videos](#)

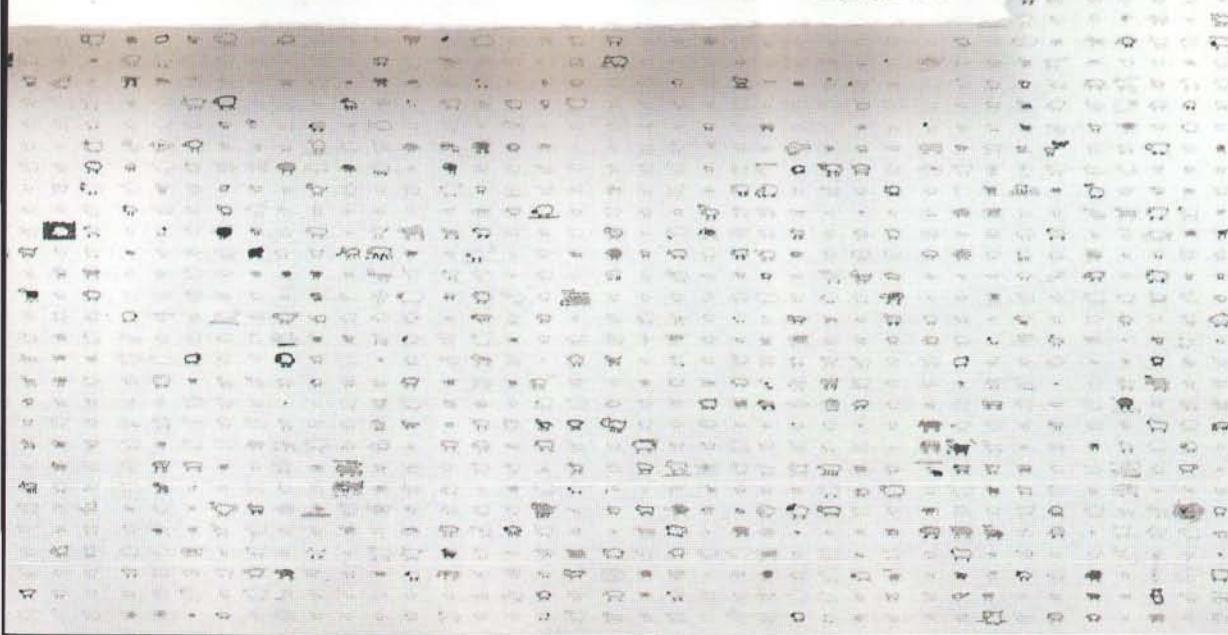
SOFTWARE  
**VVVV**

LAST EXHIBITED  
**Immersion,**  
London (2007)

Prudence uses YouTube clips of metallic blobs as virtual paint: After capturing footage of ferrofluids in action, he feeds it into a painting program of his own design. Fueled by the incoming data, the app continuously changes the shape and texture of the brush. The resulting video sequence shows a slowly morphing silvery anemone. "The most important attribute of my code-driven work is the relationship between determinism and randomness," Prudence says. "I'm turning one visual data set into another."



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## Casey Reas

PROJECT  
ORA

DATA SET  
Personal photographs

SOFTWARE  
Processing

ORIGINALLY PUBLISHED  
Imbécil CD-ROM, ALKU  
(2003)

Reas, a codeveloper of the Processing software, wanted to display the underlying information in his personal photographs in different ways for this animation project. Each of these stills shows four variants (clockwise from bottom left): the original image, a dot-matrix topographic interpretation, a dynamic presentation of the colors in sections of the picture, and (running through the middle) the signals for each color channel. "It's like data Cubism," Reas says, "viewing the same numbers as multiple representations."



The work of  
some artists, like

## Jonathan Harris and Sep Kamvar

(whose collaboration *We Feel Fine* is shown at right), don't translate very well to the printed page. To see their creation and a full online gallery of information-based art, visit [wired.com/extras](http://wired.com/extras).

photograph by GABRIELA HASBUN





When a freighter packed with cargo worth \$103 million flips onto its side in the North Pacific, a team of deep-sea cowboys gets the call. Inside the epic struggle to save the *Cougar Ace*.

BY JOSHUA DAVIS



IMO 9051375

COUGAR ACE  
SINGAPORE

TELL

S.O.S.

LATITUDE 48° 34' NORTH. LONGITUDE 174° 26' WEST.

Almost midnight on the North Pacific, about 230 miles south of Alaska's Aleutian Islands. A heavy fog blankets the sea. There's nothing but the wind spinning eddies through the mist.

Out of the darkness, a rumble grows. The water begins to vibrate. Suddenly, the prow of a massive ship splits the fog. Its steel hull rises seven stories above the water and stretches two football fields back into the night. A 15,683-horsepower engine roars through the holds, pushing 55,328 tons of steel. Crisp white capital letters—COUGAR ACE—spell the ship's name above the ocean froth. A deep-sea car transport, its 14 decks are packed with 4,703 new Mazdas bound for North America. Estimated cargo value: \$103 million.

On the bridge and belowdecks, the captain and crew begin the intricate process of releasing water from the ship's ballast tanks in preparation for entry into US territorial waters. They took on the water in Japan to keep the ship steady, but US rules require that it be dumped here to prevent contaminating American marine environments. It's a tricky procedure. To maintain stability and equilibrium, the ballast tanks need to be drained of foreign water and simultaneously refilled with local water. The bridge gives the go-ahead to commence the operation, and a ship engineer uses a hydraulic-powered system to open the starboard tank valves. Water gushes out one side of the ship and pours into the ocean. It's July 23, 2006.

In the crew's quarters below the bridge, Saw "Lucky" Kyin, the ship's 41-year-old Burmese steward, rinses off in the common shower. The ship rolls underneath his feet. He's been at sea for long stretches of the past six years. In his experience, when a ship rolls to one side, it generally rolls right back the other way.

This time it doesn't. Instead, the tilt increases. For some reason, the starboard ballast tanks have failed to refill properly, and the ship has abruptly lost its balance. At the worst possible moment, a large swell hits the *Cougar Ace* and rolls the ship even farther to port. Objects begin to slide across the deck. They pick up momentum and crash against the port-side walls as the ship dips farther. Wedged naked in the shower stall, Kyin is confronted by an undeniable fact: The *Cougar Ace* is capsizing.

He lunges for a towel and staggers into the hallway as the ship's

windmill-sized propeller spins out of the water. Throughout the ship, the other 22 crew members begin to lose their footing as the decks rear up. There are shouts and screams. Kyin escapes through a door into the damp night air. He's barefoot and dripping wet, and the deck is now a slick metal ramp. In an instant, he's skidding down the slope toward the Pacific. He slams into the railings and his left leg snaps, bone puncturing skin. He's now draped naked and bleeding on the railing, which has dipped to within feet of the frigid ocean. The deck towers 105 feet above him like a giant wave about to break. Kyin starts to pray.

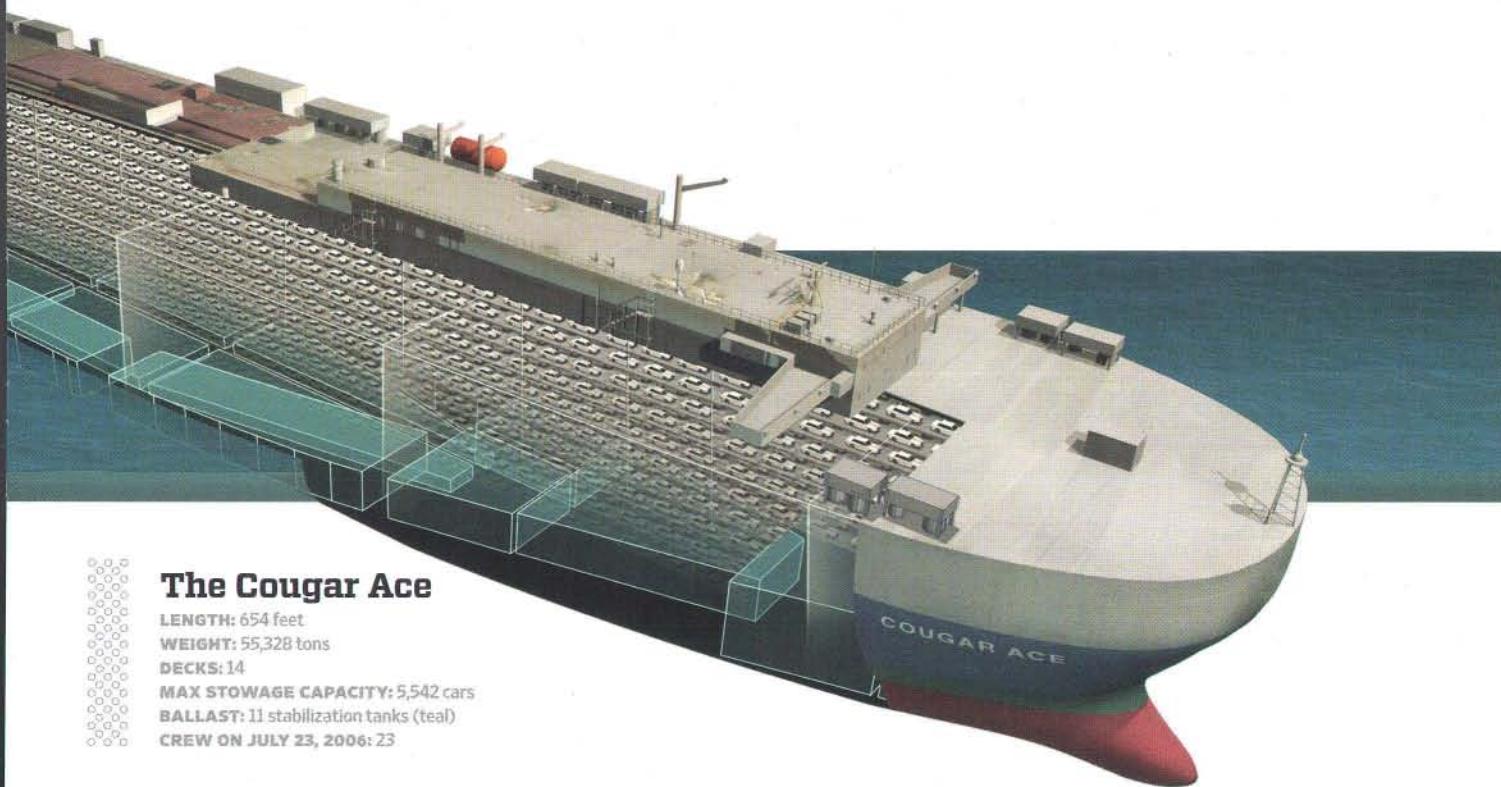
#### JACKSON HOLE, WYOMING, 4 AM.

A phone rings. Rich Habib opens his eyes and blinks in the darkness. He reaches for the phone, disturbing a pair of dogs cuddled around him. He was going to take them to the river for a swim today. Now the sound of his phone means that somewhere, somehow, a ship is going down, and he's going to have to get out of bed and go save it.

It always starts like this. Last Christmas Day, an 835-foot container vessel ran aground in Ensenada, Mexico. The phone rang, he hopped on a plane, and was soon on a Jet Ski pounding his way through the Baja surf. The ship had run aground on a beach while loaded with approximately 1,800 containers. He had to rustle up a Sikorsky Skycrane—one of the world's most powerful helicopters—to offload the cargo.

Ship captains spend their careers trying to avoid a collision or grounding like this. But for Habib, nearly every month brings a welcome disaster. While people are shouting "Abandon ship!" Habib is scrambling aboard. He's been at sea since he was 18, and now, at 51, his tanned face, square jaw, and don't-even-try-bullshitting-me stare convey a world-weary air of command. He holds an unlimited master's license, which means he's one of the select few who are qualified to pilot ships of any size, anywhere in the world. He spent his early years captaining hulking vessels that lifted other ships on board and hauled them across oceans. He helped the Navy transport a nuclear refueling facility from California to Hawaii. Now he's the senior salvage master—the guy who runs the show at sea—for Titan Salvage, a highly specialized outfit of men who race around the world saving ships.

They're a motley mix: American, British, Swedish, Panamanian. Each has a specialty—deep-sea diving, computer modeling, underwater welding, big-engine repair. And then there's Habib, the guy



## The Cougar Ace

LENGTH: 654 feet

WEIGHT: 55,328 tons

DECKS: 14

MAX STOWAGE CAPACITY: 5,542 cars

BALLAST: 11 stabilization tanks (teal)

CREW ON JULY 23, 2006: 23



who regularly helicopters onto the deck of a sinking ship, greets whatever crew is left, and takes command of the stricken vessel.

Salvage work has long been viewed as a form of legal piracy. The insurers of a disabled ship with valuable cargo will offer from 10 to 70 percent of the value of the ship and its cargo to anyone who can save it. If the salvage effort fails, they don't pay a dime. It's a risky business: As ships have gotten bigger and cargo more valuable, the expertise and resources required to mount a salvage effort have steadily increased. When a job went bad in 2004, Titan ended up with little more than the ship's bell as a souvenir. Around the company's headquarters in Fort Lauderdale, Florida, it's known as the \$11.6 million bell.

But the rewards have grown as well. When the Titan team refloated that container ship in Mexico, the company was offered \$30 million, and it's holding out for more. That kind of money finances staging grounds in southern Florida, England, and Singapore and pays the salaries of 45 employees who drive Lotuses, BMWs, and muscle cars tricked out with loud aftermarket DynoMax exhaust systems. There's also a wall at Titan headquarters with a row of photos of the men who died on the job. Three have been killed in the past three years.

Titan's biggest competitors are Dutch firms, which have dominated the business for at least a century due in part to the pumping expertise they developed to keep their low-lying lands dry. But 20 years ago, a couple of yacht brokers in southern Florida—David Parrot and Dick Fairbanks—got fed up dealing with crazy, rich clients and decided that saving sinking ships would be more fun. They didn't really know much about the salvage business but thought that the Dutch companies had come to rely too much on heavy machinery. When a ship was in distress, the Dutch firms invariably wanted to use their impressive fleet of tugs and heavy-lift cranes. Fairbanks envisioned a different kind of salvage company—one with no tugs or cranes of its own. Instead, the new outfit would buy jet-ready containers for pumps and generators, and when a ship called for help

the Titan team would charter anything from a Learjet to a 747, fly it to the airport nearest the ship, and then hire a speedboat or a helicopter to get a team aboard. If they needed a tug, they'd rent one.

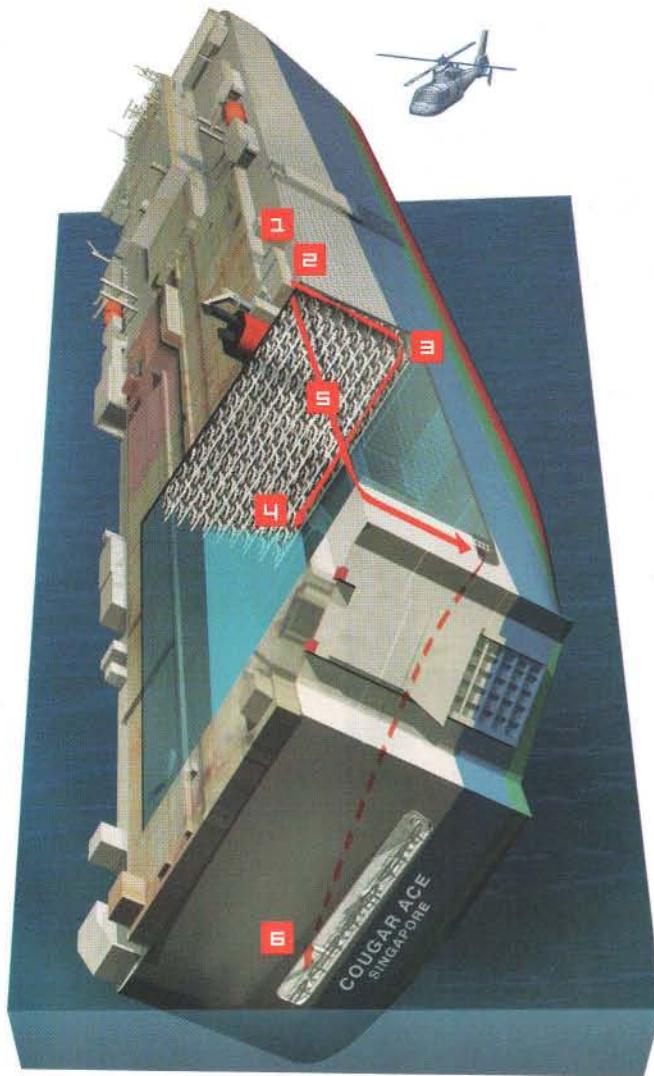
Titan's business plan hinged on the idea that ships could be saved by human ingenuity, not horsepower, and the company's unconventional approach worked. When a container ship ran aground in a remote part of Iceland in the mid-'90s, the Dutch wanted to bring in their cranes. Titan jury-rigged the ship's own 198-ton cranes and used those instead—no long-distance transport needed. In 1992, a freighter sank alongside a dock in Dunkirk, France. Again, the Dutch called for cranes, but Titan won the contract by proposing a novel approach: It hired a naval architect to create a computer model of the ship. The model indicated that the vessel would float again if water was pumped out of the holds in a specific sequence. Titan put the plan into action using a few crates of relatively inexpensive pumps; the ship bobbed to the surface as if by magic. Since then, a naval architect capable of rapidly building digital 3-D ship models has been a key member of the Titan team.

Jolted awake in Wyoming, Habib pushes himself out of bed. His dogs cluster around him. He gives Beauregard a scratch behind the ear. Clearly the dogs want to go along, but he'll need a little more help than they can give. It's time to mobilize the Titan A-team.

### SEATTLE, WASHINGTON. BREEZY. WARM.



Marty Johnson zips through the traffic in his black BMW Z3 convertible. He's wearing shades, and though he just turned 40 he has a boyish look that suits the car. But the cool-guy persona has its limits. He just learned how to drive a stick shift, so he takes the long way around town to avoid hills. He is actually a shy naval architect who likes to discuss the early history of J. R. R. Tolkien's Middle-earth and certain aspects of particle physics. But he has a taste for fast cars and the money to buy them,



thanks to an unusual ability to build digital models of ships.

Since graduating first in his class from New York's Webb Institute, a preeminent undergraduate naval architecture school, Johnson has traveled the world with his laptop, building 3-D models and helping refloat sunken things. He was on the team that recovered the Japanese fishing trawler sunk by a US submarine off Hawaii in 2001, and he oversaw a system to lift a submerged F-14 from 220 feet of water near San Diego in 2004. In his free time, he wins boat races in which the skippers build their vessels from scratch in six hours or less.

But so far, Johnson has refloated only vessels that are already sunk. Most days, he's cooped up in an office at the port, waiting for something exciting to happen. His skills don't go to waste—he's particularly well known for designing a 76-foot tugboat able to navigate rivers as shallow as 3 feet. But Johnson wants more; he wants to be one of those guys who drops onto the deck of a sinking ship and saves the day.

He's about to get his chance. His office calls: Rich Habib wants him on a salvage job for the history books—one Johnson might have missed if not for a lucky break. Habib's usual 3-D modeler, Phil Reed, is visiting his in-laws in Chicago, and his wife won't let him go to Alaska. He recommends Johnson, who has worked with Habib once before.

The job is daunting: Board the *Cougar Ace* with the team and build an on-the-fly digital replica of the ship. The car carrier has 33 tanks containing fuel, freshwater, and ballast. The amount of fluid in each tank affects the way the ship moves at sea, as does the weight

and placement of the cargo. It's a complex system when the ship is upright and undamaged. When the cargo holds take on seawater or the ship rolls off-center—both of which have occurred—the vessel becomes an intricate, floating puzzle.

Johnson will have to unravel the complexity. He'll rely on ship diagrams and his own onboard measurements to re-create the vessel using an obscure maritime modeling software known as GHS—General HydroStatics. The model will allow him to simulate and test what will happen as water is transferred from tank to tank in an effort to use the weight of the liquid to roll the ship upright. If the model isn't accurate, the operation could end up sinking the ship.

## Navigating the Ship

When the Titan Salvage crew first boarded the *Cougar Ace*, they needed to determine the extent of flooding in the holds. To get there, the men had to climb using ropes and harnesses. The mission, step-by-step:

1. Airlift to the ship on an HH-65 Coast Guard helicopter.
2. Use ropes to descend through a tilted stairwell.
3. Open the access hatch to the ninth deck and rappel past hundreds of Mazdas.
4. Survey the flooding and retrace the route back to the surface of the ship.
5. Shimmy along the top side to the rear of the ship, then climb a ladder to the back-deck opening.
6. Use ropes to descend the back deck. From the low side, jump onto a support boat.



Habib thinks Johnson is up to the task. In 2004 they worked together on a partially sunken passenger ferry near Sitka, Alaska. The hull was gashed open on a rock—water had flooded in everywhere. The US Coast Guard safety officer told Habib and Johnson to get off the ship, saying it was about to sink completely. It was too dangerous.

Habib refused. His point of view: It was his ship now, and he would do what he wanted. The safety officer reprimanded Habib and told him that no ship was worth "even the tip of your pinky."

Habib smiled. Insurance lawyers have calculated the value of a pinky—\$14,000, tops—and that's far less than the value of a modern commercial vessel.

Johnson told the Coast Guard not to worry; the ferry would be floating again in three days at exactly 10:36 in the morning. The Coast Guard was skeptical but, three days later, as the tide peaked at 10:36 am, the ferry bobbed up and floated off the rock. It was a rush to be that right.

So when he gets the message inviting him to join the team headed to the *Cougar Ace*, his only question is "When do we leave?"



### TRINIDAD AND TOBAGO, OFFSHORE

*And if I say to you tomorrow, take my hand child come with me.* The languid sound of Led Zeppelin's "What Is and What Should Never Be" drifts across the Caribbean. A 24-foot fishing boat lolls in the blue waters, the stereo cranked up in the wheelhouse. *It's to a castle I will take you, where what's to be they say will be.* The island of Trinidad—lush, green, rugged—is just off the port bow. A few beers remain in the bottom of the boat's 98-can cooler, and a bottle of Guyanese rum sloshes about on the floorboards. On the back deck, a fishing pole droops lazily from the densely tattooed arm of Colin Trepte: boat owner, rum drinker, and deep-sea diver who's always ready with a roguish grin for the ladies.

Trepte loves days like this—mid-80s, a couple of snapper in the bucket, and the sun warm on his face. A sign in the wheelhouse states **THIS IS MY SHIP, AND I'LL DO AS I DAMN PLEASE**. A silver skull dangles from a loop on his left ear.

Trepte's youth in the east end of London seems a long way off. The tattoos tell the story: The naked, big-breasted woman on his forearm stares at a demon etched in Puerto Rico, where a cargo ship ran aground. The dragon on his shoulder is from Iceland, where he cut a grounded freighter into pieces. Some of the designs have only been outlined—a crystal ball on his back remains deliberately empty. It represents the fact that, as a Titan salvage diver, he never knows when the phone will ring. And when it does, he could be bound for Eritrea or Tierra del Fuego, and the only real question is which bag to bring—cold weather or warm. Both are packed, waiting ashore in his bungalow outside Port of Spain on Trinidad.

His cell rings. It's Habib. Trepte sighs. All good days must come to an end.

"Cold weather or warm, mate?" Trepte asks.



**NORTH PACIFIC, JULY 25, 2006.**

In the hours since the *Cougar Ace* rolled, the Coast Guard and Air National Guard have scrambled three helicopters from Anchorage and, in a daring rescue effort, plucked the entire 23-man crew off the ship. Nyi Nyi Tun, the ship's captain, has ordered his crew to stay mum on the cause of the accident, and Mitsui O.S.K. Lines—the ship's owners—have declined to offer a detailed explanation. Because the incident occurred in international waters, the Coast Guard has decided not to investigate any further. Only Lucky Kyin talked that night. He was whisked to an Anchorage hospital, where a reporter from the *Anchorage Daily News* asked him how he felt. His answer: "The whole body is pain." As to the cause of the accident, all Kyin will offer is that it interrupted his shower.

Right now, it doesn't really matter how it happened. What matters is that the *Cougar Ace* has become a multimillion-dollar ghost ship drifting toward the rocky shoals of the Aleutian Islands. What's worse, according to the crew, the ship is taking on water. The Coast Guard alone doesn't have the capability or expertise to handle this kind of emergency, and officials fear that the ship will sink or break up on shore. Either way, the cars would be lost, and the 176,366 gallons of fuel in the ship's tanks would threaten the area's wildlife and fishing grounds. Mazda, Mitsui, and their insurers would take a massive hit.

At first, executives at Mitsui seem to think the ship is a lost cause. They contact Titan, but then they wait for about 24 hours, apparently under the impression that the vessel will go down before anybody can save it. When they realize that it will stay afloat long enough to break up on the shore of the Aleutians, they agree to sign what's known as a Lloyd's Open Form agreement. It's a so-called no-cure, no-pay arrangement. If Titan doesn't save the ship, it doesn't get paid. But if it succeeds, its compensation is based on the value of the ship and the cargo—in this case, a still-to-be-calculated fortune.

With the deal done, Titan charters a Conquest turboprop out of Anchorage. The propellers sputter to life. The Titan crew buckles in for the three-and-a-half-hour journey to Dutch Harbor, a small fishing town about 800 miles west of Anchorage on the Aleutian chain.

But before they take off, a final member of the team hops on. It's Titan mechanic Hank Bergman, the Swedish cowboy. As a young man in a small town in Sweden, Bergman inexplicably developed an affinity for Hank Williams and fantasized about the American West. He took a job as a ship engineer to get out of Sweden and soon built a reputation as a man who could fix anything, no matter how big. He has been with Titan since its beginning; as a result, he's had the money to buy land in Durango, Colorado, stock his 864-square-foot garage with two Jeeps and a classic Mercedes-Benz 560SL, and play cowboy whenever he wants. Now he boards the small plane wearing his trademark black leather cowboy boots and says hello to everyone in his pronounced Swedish accent.

**THE TEAM**—HABIB, JOHNSON, Trepte, and Bergman—arrives in Dutch Harbor and heads out to sea at top speed aboard the *Makushin Bay*, a 130-foot ship readied for salvage work. It's stacked with generators, steel-cutting equipment, machining tools, and salvage pumps that can remove water from the ship or transfer it from one hold to another. Johnson's laptop is loaded with GHS, and he begins building a rough model of the ship based on photographs and diagrams emailed from the owners.

After more than a day of full-speed motoring through the North Pacific, the Titan team spies the *Cougar Ace*. At first, it's only a sharp rise on the horizon. But as the *Makushin Bay* approaches, the scale of the ship dwarfs the salvage vessel. In the distance, a 378-foot Coast Guard cutter—complete with helicopter and 76-mm cannon—looks puny compared with the car carrier. It's as if the men have gone through some kind of black hole and emerged as miniatures in a new and damaged world. The *Cougar Ace* lies on its side, its enormous red belly exposed to the smaller boats around it. The propeller floats eerily out of the water, the rudder flopped hard to port in the air.

"Holy fuck," Trepte mutters.

Six hours later, an HH-65 Coast Guard helicopter flies the team to the ship and lowers the guys one by one onto the tilted deck in a steel basket. Dan Magone, the owner of the *Makushin Bay*, comes with them. He's a local salvage master himself and an expert on the region's currents, tides, weather, and shoals. He has spent more than 27 years saving fishing boats in the area and is along as an adviser to, in his words, "the big shots."

The ship is rocking, but the sea is calm, and Habib thinks it's holding steady at a list of about 60 degrees. Titan's first mission: hunt for water on board. Johnson needs to know exactly how much water is sloshing around the cargo holds so he can input the data into the digital model he's constructing.

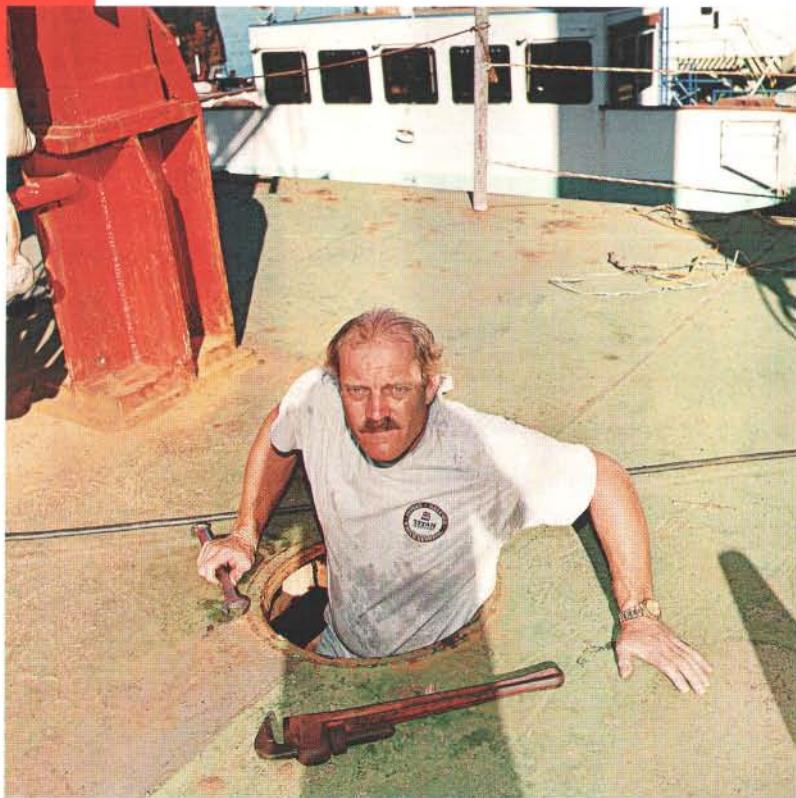
Habib unloads coils of rope from his backpack. Descending into the sharply tilted ship will require mountaineering skills. Fortunately, Habib knows what he's doing: He once scaled a 2,300-foot frozen waterfall and recalls with fondness summiting a notoriously difficult peak in the Canadian Rockies. On the way down, he was attacked by a wolf. The faded scar makes him chuckle. Maybe the mountain adventures put things in perspective. After all, this is just a giant sideways ship floating loose in the Pacific, not a deranged wolf on his back.

The guys click their LED headlamps on. The generators have gone dead, and it'll be pitch-dark below. The ship's thick steel sidewalls block radio reception, so once the men are below they won't be able to communicate with the outside world. All they'll have is each other.

RICH HABIB, SENIOR SALVAGE MASTER



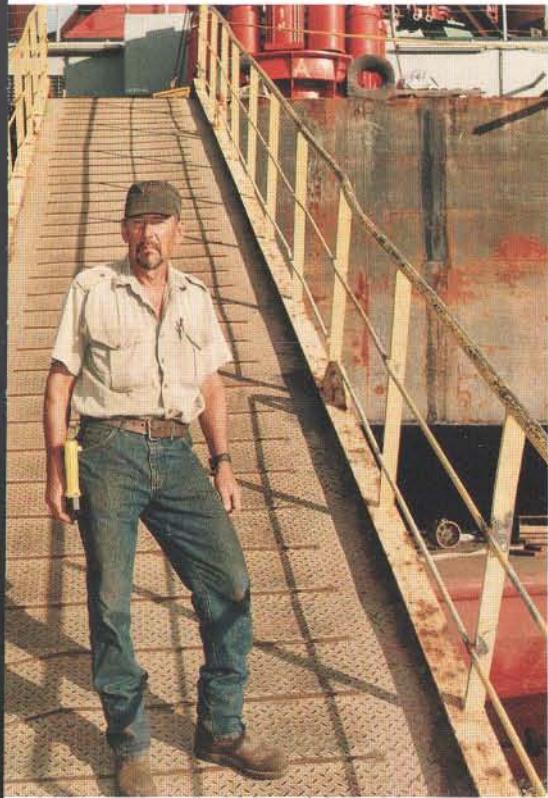
The Titan Salvage team is a motley mix of renegades, and everyone has a specialty, from underwater



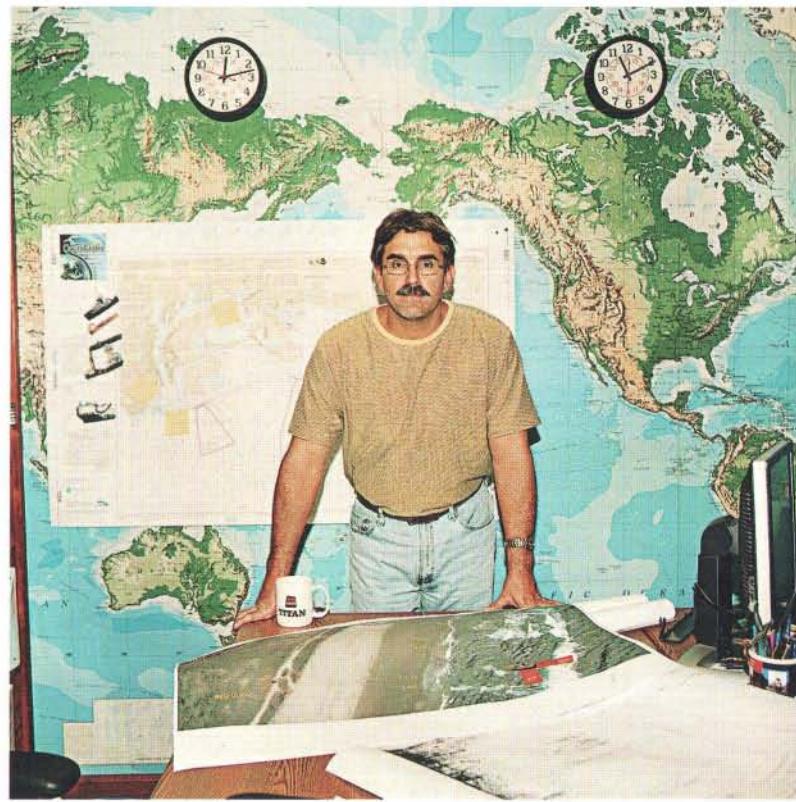
BILLY STENDER, SALVAGE DIVER



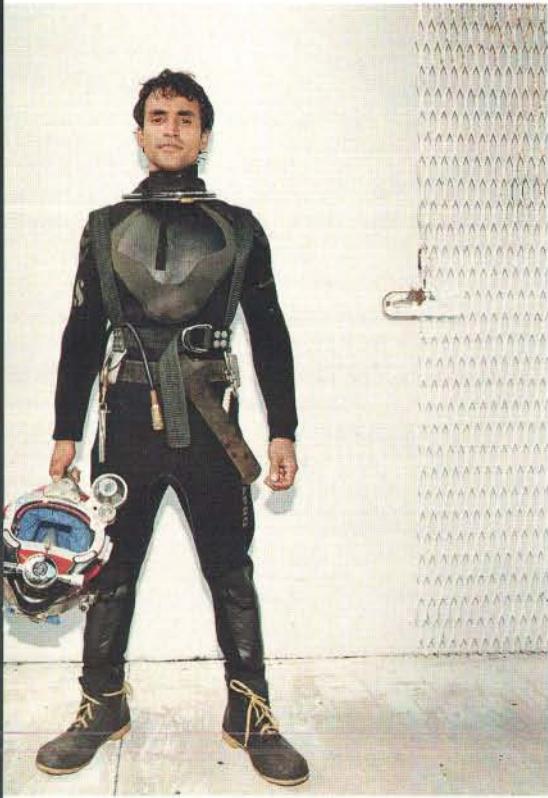
HANK BERGMAN, SALVAGE ENGINEER



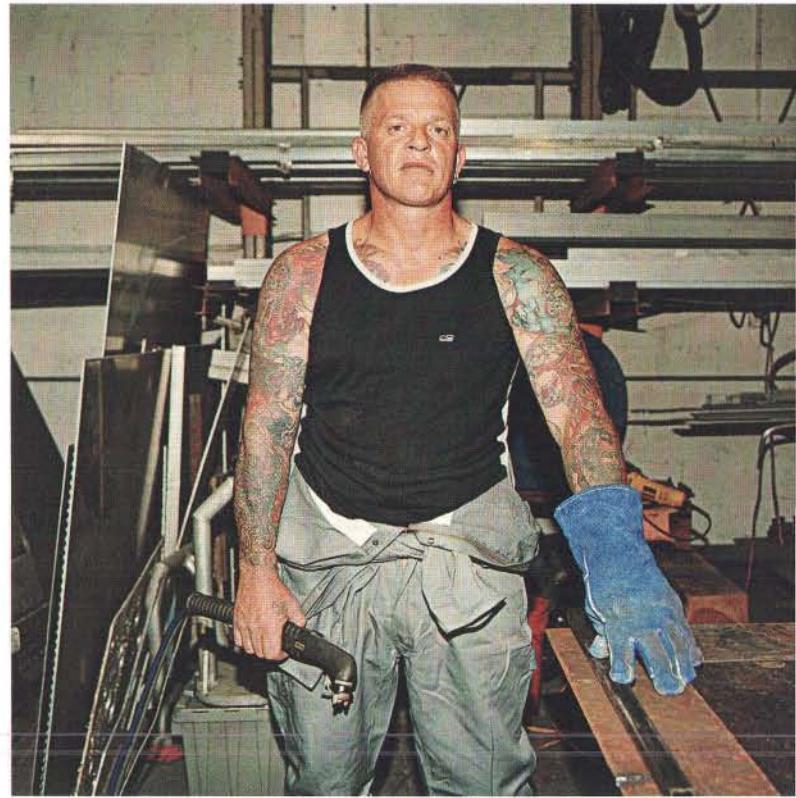
PHIL REED, SENIOR NAVAL ARCHITECT



welding to computer modeling. It's a risky business: In the past three years, three men have died on the job.



YURI MAYANI, SALVAGE DIVER



COLIN TREPTE, LEAD SALVAGE DIVER

DEEP WITHIN THE SHIP, the men dangle on ropes inside an angled staircase and peer through a doorway into the number-nine cargo deck. Their lights partially illuminate hundreds of cars tilted on their side, sloping down into the darkness. Each is cinched to the deck by four white nylon straps. Periodically a large swell rolls the ship, straining the straps. A chorus of creaks echoes through the hold. Then, as the ship rolls back, the hold falls silent. It's a cold, claustrophobic nightmare slicked with trickling engine oil and transmission fluid. Trepte lowers a rope and eases into the darkness.

Everyone is wearing a harness with two carabiners attached to short straps. They've tied loops every few feet into some of their ropes, creating a series of descending handholds. Like rock climbers rappelling in slow motion, they back down the steep deck, lowering themselves one looped handhold at a time. Habib tells them to always keep one carabiner attached to a loop in the rope; that way, if they fall, the rope will save them.

They reach the middle of the deck. There's a ramp built into the side of the hull at this level—it's for driving cars on and off the ship. Now a good deal of the ramp's exterior is about 25 feet underwater. It's got a thick rubber seal, but it wasn't designed to take the pressure of submersion. Habib thinks it might be leaking.

Sure enough, as they descend farther, Trepte sees green water with a sheen of oil. The water is about 8 feet deep and runs the length of the compartment—dozens of new Mazdas can be seen beneath the murky surface like drowning victims. It means the seal has been compromised. It's leaking slowly and could fail completely at any moment. If that happened, seawater would fill the deck in a matter of minutes and drown them all. But Habib figures that since it has lasted this long, it's probably OK for now.

Trepte measures the dimensions of the wedge of water in the hold using a metal weight and string and shouts out the numbers. While Johnson does some trigonometry on a small pad of paper, Habib accidentally steps on one of the straps securing a car, and the Mazda lurches downward with a screech. Trepte looks up with a start and realizes that he's at the bottom of a suspended automotive avalanche. Dozens of cars hang over his head. If one broke its straps, it would trigger a domino effect, sending a pile of Mazdas down on top of him.

"Ay, mate, try not to kill me down here, won't ya?" Trepte shouts up to Habib.

"Rog-o," echoes the response from the shadows.

Johnson finishes his calculations—the wedge of water weighs 1,026 tons, part of the weight keeping the ship pinned on its side. They will have to pump this water overboard and then fill the high-side tanks to add enough ballast to bring the ship back to an even keel. According to Johnson's preliminary computer simulations, pumping 160.9 tons into the starboard-side tanks will do the trick. But the model shows that any more than that may roll them all the way over to the other side.

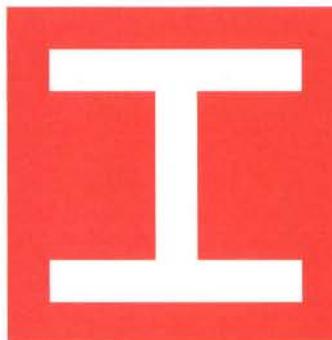
"You're talking about a flop?" Habib asks.

"That's what I'm saying," Johnson replies.

The situation is more precarious than Habib had thought. If they overfill the high-side starboard tanks, the *Cougar Ace* will roll back

to normal—but then keep going, potentially in a matter of seconds. Everybody on board would be catapulted from one side of the ship to the other, and the car straps could snap. If the cars were to pile up on one side, the added weight would create even more momentum, causing the ship to roll upside down and sink.

To avoid that, they need to pump a precise amount of water. It's Johnson's job to figure out exactly how much. In an ideal world, he would plug in data for the position and weight of all the cars and the amount of liquid in each of the ship's 33 tanks and 14 decks. Unfortunately, there's not enough time to collect all that information. He'll have to do some guessing and hope his instincts are good.



T'S GETTING DARK by the time they emerge from inside the ship—they were down for more than three hours—and Habib decides not to ask the Coast Guard to pull them off by helicopter. It would be risky in the twilight. Given the calm sea, he figures they can make their way to the back deck of the ship and jump from the low port side onto the *Makushin Bay*.

But when they reach the back and take stock of the situation, it doesn't seem that simple. If the deck were flat, they could just walk straight across. But now it's a 105-foot metallic cliff dotted with keg-sized steel bollards. If one of the guys were to slip when not clipped in to a rope, no amount of clawing on the hard surface would arrest his slide. He would rocket down the 60-degree incline with only the blunt steel of the bollards to break his fall.

What's worse, the automated fire-prevention system vents onto the deck. Since the generators have been down for days, the system's chilled liquid carbon dioxide is warming and expanding. Every few minutes, the oxygen-snuffing chemical explodes out of the vent in a raging, negative-110-degree cloud. Direct exposure could cause frostbite and even suffocation. Habib has tested the area with an oxygen monitor, and despite the deafening white clouds of gas that periodically explode across the deck he assures everyone that there's plenty of fresh, breathable air.

Still, the situation makes Johnson nervous. He's standing on the side of a giant winch 25 feet above the vent. He'll have to climb through the blast area to get off the ship, and his backpack is stuffed with 30 pounds of gear. It's going to be difficult to move down the looped lines with that extra, cumbersome weight.

Magone is anxious to get off the ship before nightfall makes it too difficult to jump onto the *Makushin Bay*. He begins to back down the deck, followed by Trepte and Bergman. The carbon dioxide explodes out of the vent, raining down slivers of dry ice. They pause to shield their faces and then keep descending.

Johnson's nervousness mounts, and he stays put. He tells Habib that his backpack is bothering him. Habib offers to climb back up to the helicopter drop zone—there's extra rope there, which he can use to lower the backpack. While Johnson twists his way out of the pack, Habib heads back up toward the drop zone.

When he reaches the lower end of the deck, Magone looks up and sees that Johnson still hasn't started his descent. "What's taking him so long," Magone wonders. "Ready for the next guy!" he shouts.

A moment passes, and suddenly Johnson is hurtling down. He blurs past Bergman, screaming. Johnson is falling, and he isn't clipped in

to anything. His body ricochets off a steel stanchion, sending him into an uncontrollable spin. He plunges upside down past Trepte. Nobody has time to react—in little more than a second, he has fallen 80 feet and his head smashes into a winch, with a sickening thud. His face smacks the metal, ripping a deep laceration in his forehead. Water sloshes just below him. Blood drips into it.

"Shit, shit, shit!" Trepte shouts. He steadies himself for a moment, then radios Habib: "Marty's had a tumble."

On the top deck, Habib is coiling rope. "A tumble?" he thinks. He keeps coiling for a few seconds. A tumble's not a big deal—a tumble is like a slip and a twisted ankle. But then he realizes that a tumble for someone like Trepte could mean falling out of an airplane with no parachute. Trepte wouldn't call him unless it's serious, unless Johnson were truly injured or unconscious.

"Is he conscious?" Habib radios back, a note of rising fear in his voice.

"No," Trepte's voice squawks through the radio.

Habib hurls the rope down and races back the length of the ship. He climbs as fast as he can down the looped line through the carbon dioxide blast zone. Magone has swung over to the winch in the center of the deck and is struggling to stay in position over Johnson.

"Is he breathing?" Habib shouts.

Magone can't tell. Johnson is face down, and Magone is afraid to move him by himself. Habib swings over on a rope, and together they roll Johnson face up. His eyes are open, staring straight through Habib. No blinking. No movement. There's blood everywhere and he doesn't seem to be breathing, but he has a pulse. He's alive.

Habib's heart is racing. There's a chance. He starts mouth-to-mouth just as a boat crashes into the *Cougar Ace* only feet from Habib and Magone. It's the *Emma Foss*, a 101-foot tug whose crew, alerted by the radio exchange, has come to help. But the collision rips off a piece of the railing that's supporting Habib. He splashes into the cold water beneath the winch. In an instant, he muscles himself back up beside Johnson.

"Let's get him off," Habib shouts. He's thinking, "He can make it. He's got a pulse."

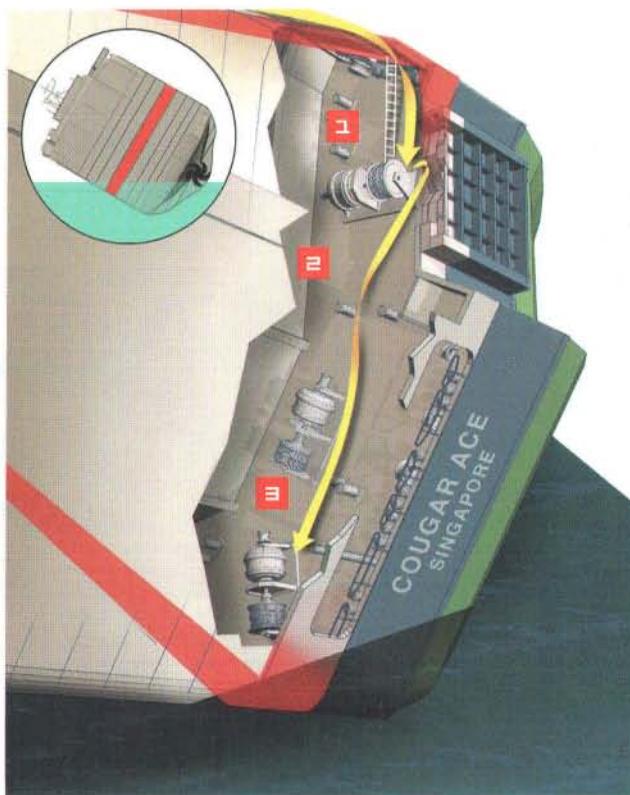
A stretcher is passed over from the *Emma Foss*. The men strap Johnson in and transfer him to the tug, which takes him to a Coast Guard cutter; its medical facilities can keep him alive. It's not too late.

"Come on, Marty," Habib says as they heft the litter back to the tug. "We're gonna get you out of here. Just hang in a little longer."

Johnson is hauled aboard the cutter, and the corpsmen establish a radio connection with their onshore surgeon. Coast Guard med-

ics take over while Habib and his team jump onto the *Makushin Bay* and wait nervously for an hour. At 11 o'clock, the captain of the cutter calls Habib.

Marty Johnson is dead.



## How Marty Johnson Fell

To get off the ship, Johnson and the others on the Titan team made their way to the back deck, then climbed down the steeply angled surface to the low side. For Johnson, it was a daunting task—he was inexperienced as a climber and carrying a pack loaded with 30 pounds of bulky gear.

1. He was standing on the starboard winch. He wasn't clipped in to his safety rope when he slipped and plummeted down the deck.

2. After 20 feet, he struck a bollard and began spinning.

3. He tumbled 60 feet more, coming to rest on the port-side winch.



THROUGH AN OVERCAST SKY, the sun dawns faintly the next morning. The Coast Guard sends a lieutenant to the *Makushin Bay* to find out what happened and assess the state of the team. On the surface, Trepte and Bergman seem fine. Trepte has already moved into Johnson's bunk—"he won't be needin' it," Trepte says. But a numbness seems to have gripped Habib. Maybe he should send his team home before any more lives are lost. Maybe it's time to abandon the *Cougar Ace*.

The lieutenant listens as Habib recounts the facts leading up to the accident: Johnson was standing on the high-side winch. Somehow he slipped and hadn't been clipped in to a rope. When Habib starts to talk about trying to save his teammate, about staring into his blank eyes, he feels a swelling in his throat. He can sense tears coming. Johnson was one of Habib's guys and was among the nation's best naval architects. Habib looks away.

What he sees isn't comforting. The *Cougar Ace* looms over the *Makushin Bay* like a rogue wave on pause. It can't be ignored—it's now 140 miles from shore, and the weather is expected to deteriorate. Winds of 26 miles per hour are expected by the next sunrise, and the weather service predicts 16-foot waves within a few days. The team has to get back on board and connect a towline to the *Cougar Ace*, or it will either sink or be driven ashore. The Coast Guard, the area fishermen, the ship owners, Mazda—everyone is depending on them, but they're battered, undermanned, and flying blind without Johnson. Habib makes a decision: He'll stay. But to | **CONTINUED ON PAGE 187**

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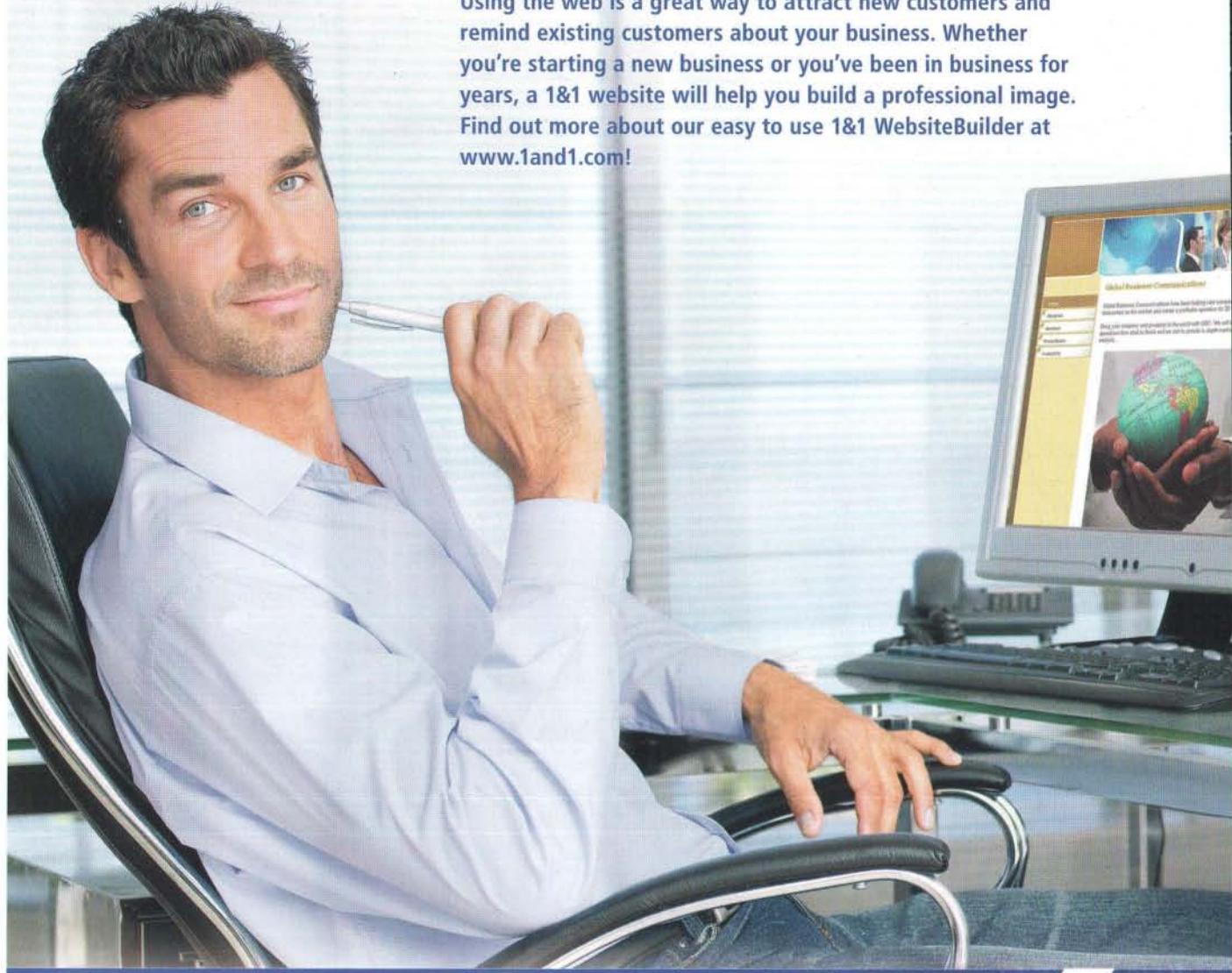
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## Sea Cowboys

CONTINUED FROM PAGE 181

see this job through, he needs more help. He makes a call to headquarters in Florida.

A Coast Guard ship takes Johnson's body back to Adak, a rugged Aleutian island with an airstrip. Soon, a twin-propeller plane floats down out of the sky and stops at the end of the runway. The plane's ramp flips open, and guys lugging cold-weather gear hustle down to the tarmac. They glance at the body bag and keep moving. The reinforcements have arrived.

Phil Reed—Titan's chief naval architect—got the go-ahead from his wife and leads the men. In the early '90s, Reed was one of the first to repurpose naval-architecture software for use on salvage jobs. Now 48, he's Titan's most senior 3-D modeler—a sort of geek in residence. But Reed is not a typical nerd. Sure, on almost every job he's the only guy scampering across the decks with a laptop, and he absentmindedly taps the tip of his fluorescent highlighter on his head, leaving yellow streaks across his Titan baseball cap. But he's also the guy who went into Banda Aceh after the 2004 Indian Ocean tsunami and persuaded the Indonesian military to protect the Titan team while it hauled away an upside-down 684-foot cement ship. He can take the heat as well as any guy on the team.

Two deep-sea divers—Yuri Mayani and Billy Stender—follow Reed. They look like a rough-and-tumble version of Laurel and Hardy. Mayani is a foulmouthed, hot-tempered 5'2" Panamanian with rippling muscles. Stender is a laconic 6'2" Michigan native who spends as much time as he can living in a trailer in the woods near the Canadian border. Somehow, these two have become good friends. If they're not on a job, Mayani hangs out in Michigan, cursing wildly about the cold until Stender gets enough Pabst Blue Ribbon in him. With Mayani around, Stender can sink into his natural state of bemused reticence. Anything he's

thinking—whether it's about lining up the next drink or the knockers on that blonde at the end of the bar—Mayani tends to say first and five times louder. "We understand each others" is how Mayani puts it. Stender refers to his friend as "the Panamanian."

The *Sycamore*, the Coast Guard ship that brought Johnson's body ashore, takes the new guys on board, and they push off for a rendezvous with the *Cougar Ace*. Someone from Titan headquarters in Florida calls Habib to say that Mayani, Stender, and Reed are under way. Habib hopes they'll arrive before the weather hits. The seas are already getting rougher, and that can only mean more trouble.

**At 12:45 am**, a fierce rain and heavy rolling ocean wakes Habib aboard the *Makushin Bay*. He asks the captain of the *Emma Foss* to use its searchlight to survey the *Cougar Ace*'s low port-side cargo vents. Normally, these vents release car exhaust from the deep holds as vehicles are driven on and off the vessel. When the ship is upright, the vents sit about 70 feet above water and have flaps to prevent rain from entering. They were never meant to be submerged, but now the *Emma Foss* radios back that the high seas are churning to within 3 feet of the vents. If they go under, seawater will likely push open the flaps and surge into the ship's holds, sinking the *Cougar Ace*.

By noon, Habib fears he's about to lose the ship. The rapidly building swell is breaking on the port side, driving waves up to the vents. At the same time, the swell has increased the ship's roll, dipping the vents toward the waves. Habib's only hope is to tow the ship into the Bering Sea on the lee side of the Aleutians—something the Coast Guard wants him to avoid because of the potential risk to the environment. The *Sea Victory*—a 150-foot tug—has arrived and managed to lasso a cleat on the back of the *Cougar Ace*. The tug's 7,200-horsepower engine has the strength to pull the ship through the fast currents of the Samalga Pass and get to the lee side of the islands. If Habib can do that, the land will act as a shield against the wind and waves. He's got no choice. It's time to run the gauntlet.

**Under low-hanging clouds**, the *Cougar Ace* and its convoy of tugs, Coast Guard escort, and salvage craft crash through the swell in a mad dash for the Bering Sea. The *Sycamore*,

bearing Reed, Stender, and Mayani, has gone full throttle to make this rendezvous, and the guys now stand on the deck and watch the cursed armada bear down on them.

Mayani stares at the sideways ship with disbelief. The *Cougar Ace* looks like a death trap to him—the crew must have been hit hard. "How many motherfuckers it died in there?" he asks.

"One," Stender says. "Our guy."

"Trick-Fuck," Mayani spits. He has a lot of respect for Habib but refers to him as "Trick-Fuck" because Habib is always tricking him into doing crazy things. And, from where Mayani is standing, this is going to be the biggest trick-fuck yet.

It's certainly one of the craziest things Reed has ever seen on the sea. He boards the *Makushin Bay*, and Habib grimly hands him Johnson's computer. Reed agrees with Johnson's assessment—the ship could easily flop. To decrease that risk, the team needs to make sure that the largest low-side ballast tank is filled, so it counterbalances any rapid roll. The crew had reported that they left it half full. This will be the team's first important task: a journey to the deepest part of the ship to drill a hole in the tank and fill it all the way.

To get there, they will have to descend like spelunkers. So Habib orders his men onto the *Redeemer*, a 132-foot tug that has joined the operation. He greets them gruffly and takes hold of a rope hanging from a railing on the *Redeemer*'s upper deck and begins to climb using a device called an ascender. They're at the mouth of the Samalga Pass—there's no time for small talk.

Mayani looks at Stender out of the corner of his eye and asks him what's wrong with Habib: "He a fucking monkey now?"

"Shut up!" Habib shouts. He explains that the *Cougar Ace* has become a labyrinth. Since it's heeled onto one side, they'll have to learn how to walk on walls and scale the sloping, perilous decks. Unfortunately, they'll have to learn to do it in the middle of the ocean. This will be their only chance to practice before they board the ship. Hopefully, no one else will die.

While the team trains on the ropes, the tugs haul the *Cougar Ace* safely through the pass and into the calm waters of the Bering Sea. The vents ride higher above the surface—that's one less danger, for the time being. Now they need to get back aboard. The *Emma Foss* deposits the newly expanded team on the low

side of the *Cougar Ace*'s back deck, just a few feet from where Johnson died.

Reed serves as the navigator through the intricacies of the vessel's holds—he has spent the past 24 hours memorizing the *Cougar Ace*'s complex design. But it's one thing to picture the orderly lines of a blueprint, quite another to traverse the dark confines of a capsized ship. As a result, Reed is not always sure where they are, and the darkness fills with a steady stream of Mayani's elaborate Spanish curses. Nobody wants to get lost inside this thing.

It takes them almost three hours of rappelling and climbing to descend to the 13th deck, and when they get there, no one is that excited to have arrived. This far down, they are well below the waterline. The Bering Sea presses in on the steel hull. They feel like they're inside an abandoned submarine.

Reed and Habib crawl along the tilted deck, periodically consulting a drawing of the ship's internal compartments. They rap their knuckles on a piece of steel—this is the top of the low-side ballast tank. Trepte pulls out a drill and bores down. Suddenly, water erupts. The tank is already full and pressurized—water must be flowing in through a broken vent on the underwater side of the ship. It sprays furiously. They have unwittingly caused the worst thing possible: The deepest cargo hold is flooding.

In an instant, Trepte covers the hole with the tip of a finger and presses hard. The sound of gushing water abruptly stops, and the shouts and curses of the moment before echo through the hold. Salt water drips off Mazdas, and the panic the men all felt transforms into a contagious laugh.

Trepte is keeping the ship afloat with one finger.

"Well, I guess the tank is already full," Reed chuckles.

"Very funny," Trepte says. "Now whyn't some of you smart chaps go figure out how to fix this bloody mess."

While Habib races to the *Makushin Bay* to find a solution, Mayani plugs the hole with his finger to give Trepte a break. They go back and forth for an hour and a half before Habib returns with a tapered metal bolt to jam into the hole. Their fingers took a beating, but now they know that the tank is full. Reed enters the data into his computer model, runs the numbers, and tells Habib how much water he needs to pump into the high-side tanks. It's time to roll the ship.

**The plan is to position** large pumps throughout the ship and begin moving liquid in a sort of orchestrated water ballet. Reed has already choreographed the dance in his GHS model but still hasn't been able to find a solution that guarantees the ship won't flip. When he runs the simulation, GHS sometimes shows the ship righting itself, but sometimes it just keeps rolling until it's belly-up. Then it sinks.

Habib decides not to worry about that right now and tells Mayani and Stender to position pumps near the water that has flooded into deck nine. Though they are both highly trained deep-sea divers, they play many roles on a salvage job. They can operate cranes, drive bulldozers, and slice through metal with plasma torches; Stender can even fly a helicopter. Right now, their role is to lug the 100-pound pumps into place. Since there

"I'm no fucking pinball, motherfucker!" Mayani shouts as he slams against walls and cars. Stender likes the pinball reference and starts calling himself the pinball wizard.

The shouting brings Habib rappelling down. He shines his headlamp on Mayani, who—still hugging the pump—is swinging back and forth in an attempt to build up enough momentum to hop over a column of cars.

"What are you two doing?" he asks.

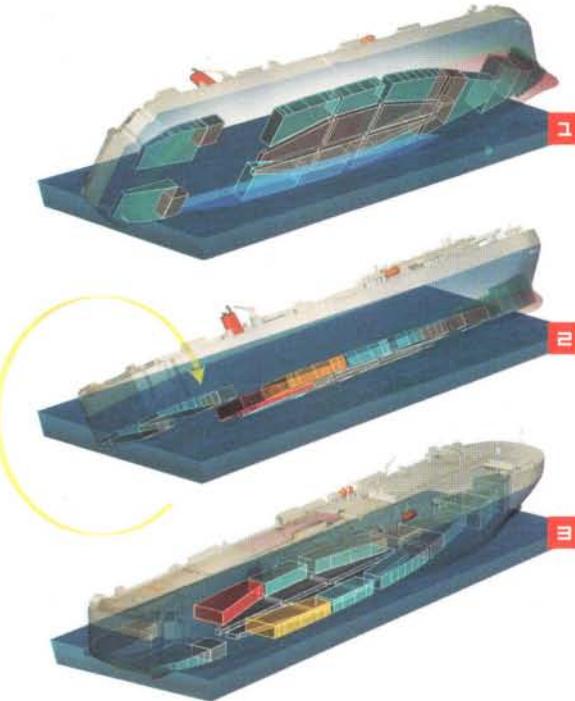
"What the fuck it look like we're doing?" Mayani shouts. "Stealing cars?"

"Listen, I don't want any damage," Habib says. "Not even a fingerprint."

Mayani swings away from the cars with the pump and then back, picking up more speed than he expected. He smashes into the windshield of a CX-7 and clobbers the sideview mirror of another.

## Righting the Ship

The Titan Salvage crew built a digital model of the *Cougar Ace* so they could develop the following plan for shifting water between ballast tanks (teal) before attempting to right the ship.



are no functioning winches on board, the two men haul the pumps by hand, using, as Mayani likes to say, a combination of "mandraulics and the man-crane."

Mayani is assigned to play pump monkey. Stender ties one rope around his buddy, a second rope around a pump, and then, using a rock-climbing belay device, lowers both down the face of deck nine. Mayani hugs the pump so that it doesn't get banged up on the way down. What happens to Mayani is another matter.

"You're coming with me, bitch!" Mayani screams at the mirror and rips it clean off.

Habib shakes his head.

"Sorry!" Mayani shouts. "It was either me or the fucking mirror."

**Once the pumps** are set up, Stender and Mayani explore the ship. Mayani is on the hunt for some binoculars—he likes to collect mementos from jobs. He took a bright-yellow plastic radio beacon from the last ship he helped save and displays it proudly next

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to the flat-screen TV in his Florida condo. Sometimes the ship's crew objects, calling the guys pirates.

"What the fuck you think we are?" Mayani likes to say. "We look like yuppies?"

Luckily, the *Cougar Ace* is a ghost ship—there's no one to get in their way. Stender and Mayani make their way to the bridge. There are no ropes up here, so they're not clipped in to anything. They find a door on the high side of the bridge, but when Mayani jostles it, it flies open, throwing him off balance. Stender lunges for him, but Mayani falls inside and slides down the steeply inclined bridge. As he accelerates, he grasps for anything and manages to wrap an arm around the captain's chair 40 feet down, arresting his fall. Amazingly, he sees a pair of binoculars dangling from the chair.

"Are you OK?" Stender shouts, on the verge of panic.

"I found the motherfucking binoculars," Mayani responds, momentarily forgetting that he's hanging off the chair as though it were a tree sprouting off a cliff.

"Good job," Stender shouts back. "You did that real nice. Now how the hell you plan to get out of there?"

Mayani doesn't have a good answer. Stender looks around and sees a fire hose. He grabs the nozzle, lowers it down, and Mayani climbs up the hose. He took the type of fall that killed Johnson, but Mayani doesn't seem too bothered. Instead, he scrutinizes the binocs. One of the lenses is cracked.

"Shit," he says and throws them back down into the bridge.

**"OK everyone,"** Habib says into his mic. Radios crackle across the *Cougar Ace*. Bergman, Trepte, Mayani, and Stender are ready to drop down into the holds and fire up the pumps. An additional four Titan guys have arrived to assist. "Let's get this ship straightened up," Habib says.

The pumps roar to life. Reed's model doesn't indicate how fast the ship will roll upright. If it's anything like the time the ship first rolled, it will be fast. It could be a dangerous roller-coaster ride.

Since the radios aren't powerful enough to reach the lower holds, Habib acts as both salvage master and radio relay, climbing halfway down into the ship so that his radio is close enough to pick up the signal of the guys up top and lower down. He follows Reed's plan and shouts orders: "Pump the wedge of

water on deck nine overboard. Begin filling the fifth starboard ballast tank now." He's like the conductor of an unusual, waterlogged symphony.

Reed's calculations show that the fifth starboard ballast tank has to be about 20 percent full to bring the *Cougar Ace* all the way up, and as water begins to pour into the tank the ship starts to come off its 60-degree list.

"We're rolling her," Habib radios calmly.

Everyone aboard waits anxiously for the ship to flip in an instant, but the vessel rises slowly, like a stunned boxer after a heavy blow. Water cascades down its sides. It makes no sudden movements—it's as if the ship itself has been trying to figure out whether it can do this, whether it can really return to the land of the living.

As the Titan team coaxes the *Cougar Ace* upright, Habib ties a water bottle to one end of a rope and affixes the other end to a pipe, forming an improvised plumb line. Using some basic trig, he calculates their progress: 56.5 degrees ... 51 degrees ... 40 degrees. The *Cougar Ace* is coming up. Every hour it looks more and more like a normal ship.

Stender and Mayani stay on board, sleeping on cars, smoking cigarettes, and tending the pumps. For lunch, they toss one end of a line out a door that's halfway down the starboard hull. It reaches the *Makushin Bay* 50 feet below, and the boat's crew ties some food on the line. But when Stender and Mayani haul it up to discover a meal of boiled cabbage and popcorn, they snap. "We don't eat cabbage, you fucking fucks!" Mayani screams, hurling the cabbage at the crew. The crew dodges the fusillade of wet, steaming cabbage, and it splatters onto the decks and wheelhouse of the *Makushin Bay*.

As cabbage explodes out of the *Cougar Ace*, Habib checks his pendulum again and sees that it's still moving: 34 degrees, then 28 degrees and counting.

By the end of the second day of pumping, the *Cougar Ace* is upright. A few days later, the owners come aboard to reclaim the ship. What initially seemed like a lost cause is now floating freely. It did not sink. Ninety-nine percent of its cargo is intact. There was no environmental disaster.

Soon, a payment of more than \$10 million is wired to Titan's account.

**For more than a year,** the 4,703 *Cougar Ace* Mazdas sit in a huge parking lot in Portland, Oregon. Then, in February 2008, the

cars are loaded one by one onto an 8-foot-wide conveyor belt. It lifts them 40 feet and drops them inside a Texas Shredder, a 50-foot-tall, hulking blue-and-yellow machine that sits on a 2.5-acre concrete pad. Inside the machine, 26 hammers—weighing 1,000 pounds each—smash each car into fist-sized pieces in two seconds. The chunks are then spit out the back side.

Though most of the cars appeared to be unharmed, they had spent two weeks at a 60-degree angle. Mazda can't be sure that something isn't wrong with them. Will the air bags function properly? Will the engines work flawlessly throughout the warranty period? Rather than risk lawsuits down the line, Mazda has decided to scrap the entire shipment.

Habib and the guys don't really give a damn. In the 16 months since they saved the *Cougar Ace*, the team has done laps around the globe. They pulled a stranded oil derrick off the world's most remote island, 1,700 miles west of South Africa. Then they wrangled a 1,000-foot container ship off a sandbar in Mexico and rescued a loaded propane tanker in the middle of a Caribbean storm.

But none of the men will forget the *Cougar Ace*. When Mayani does shots of Bacardi at clubs in Miami Beach, he sometimes thinks back to the first time he saw the car carrier floating sideways on the sea. It gives him a chill until the rum takes hold. For Stender, it's the same. Trepte is the only one who doesn't seem affected.

"Listen, mate, all I do is crazy shit," he says, on a cell phone from his bungalow on Trinidad. "You get used to it."

But Habib doesn't get used to it—Johnson's death still weighs on him. When Titan asks him to attend a CPR refresher course, he arrives solemnly in the hotel conference room near the Fort Lauderdale airport. The instructor lays out a few plastic dolls on the carpeted floor and asks Habib to demonstrate his technique. A couple of other Titan employees in attendance joke that the emaciated mannequins resemble some prostitutes they met on a recent job in Russia. Habib doesn't smile. He doesn't join their laughter. He kneels down beside one of the pale forms, breathes into its mouth, and tries to bring it back to life. 

---

*Contributing editor JOSHUA DAVIS (www.joshuadavis.net) wrote about the cyberattack on Estonia in issue 15.09.*



## I'm Autistic

CONTINUED FROM PAGE 159

ing and promising.

Surprisingly, they didn't find any variability in which parts of the brain lit up when subjects performed the tasks. "We thought we'd see different patterns of activation," Zeffiro says, "but it looks like the similarities outweigh the dissimilarities." When they examined participants' Raven scores together with response times, however, they noticed something odd. The two groups had the same error rates, but as an aggregate, the autistics completed the tasks 40 percent faster than the non-autistics. "They spent less time coming up with the same number of right answers. The only explanation we can see right now," Zeffiro says, is that autistic brains working on this set of tasks "seem to be engaged at a higher level of efficiency." That may have to do with greater connectivity within an area or areas of the brain. He and other researchers are already exploring this hypothesis using diffusion tensor imaging, which measures the density of brain wiring.

But critics of the difference model reject the whole idea that autism is merely another example of neuro-diversity. After all, being able to plan your meals for the week or ask for directions bespeak important forms of intelligence. "If you pretend the areas that are troubled aren't there, you miss important aspects of the person," says Fred Volkmar, director of Yale's Child Study Center.

In the vast majority of journal articles, autism is referred to as a disorder, and the majority of neuro-psychiatric experts will tell you that the description fits—something is wrong with the autistic brain. UCSF's Merzenich, who agrees that conventional intelligence-testing tools are misleading, still doesn't think the difference model makes sense. Many autistics are probably smarter than we think, he says. But there's little question that more severe autism is characterized by what Merzenich terms

"grossly abnormal" brain development that can lead to a "catastrophic end state." Denying this reality, he says, is misguided. Yale's Volkmar likens it to telling a physically disabled person: "You don't need a wheelchair. Walk!"

Meanwhile parents, educators, and autism advocates worry that focusing on the latent abilities and intelligence of autistic people may eventually lead to cuts in funding both for research into a cure and services provided by government. As one mother of an autistic boy told me, "There's no question that my son needs treatment and a cure."

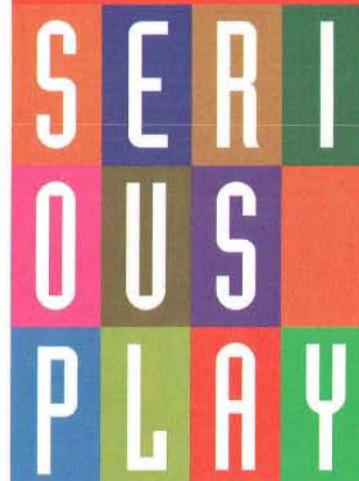
**Back in Burlington**, Baggs is cueing up another YouTube clip. She angles her computer screen so I can see it. Set to the soundtrack of Queen's "Under Pressure," it's a montage of close-up videos showing behaviors like pen clicking, thumb twiddling, and finger tapping. The message: Why are some stress-related behaviors socially permissible, while others—like the rocking bodies and flapping arms commonly associated with autism—are not? Hit count for the video at last check: 80,000 and climbing.

Should autism be treated? Yes, says Baggs, it should be treated with respect. "People aren't interested in us functioning with the brains we have," she says, because autism is considered to be outside the range of normal variability. "I don't fit the stereotype of autism. But who does?" she asks, hammering especially hard on the keyboard. "The definition of autism is so fluid and changing every few years." What's exciting, she says, is that Mottron and other scientists have "found universal strengths where others usually look for universal deficits." Neurocognitive science, she says, is finally catching up to what she and many other adults with autism have been saying all along.

Baggs is working on some new videos. One project is tentatively titled "Am I a Person Yet?" She'll explore communication, empathy, self-reflection—core elements of the human experience that have at times been used to define personhood itself. And at various points during the clip, she'll ask: "Am I a person yet?" It's a provocative idea, and you might find yourself thinking: She has a point. 

**DAVID WOLMAN** (david@david-wolman.com) wrote about a terrorist attack response drill in issue 16.02.

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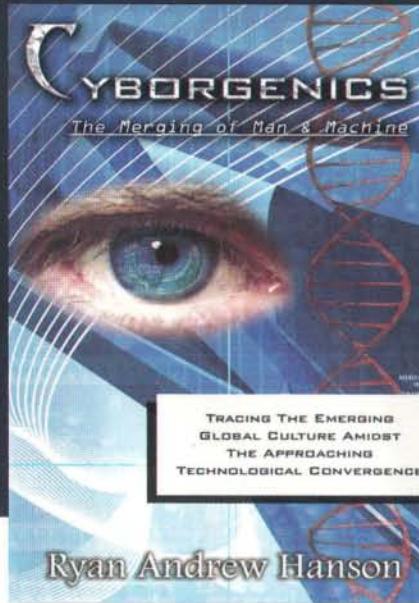
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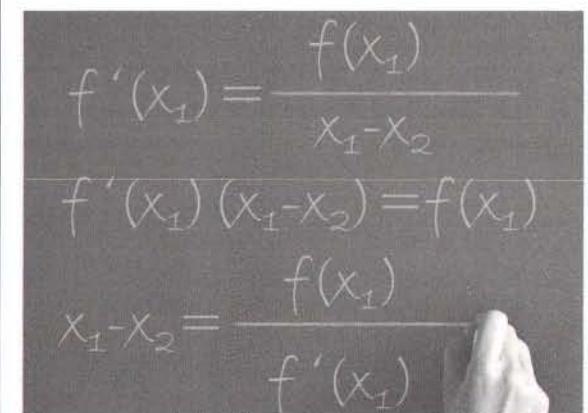
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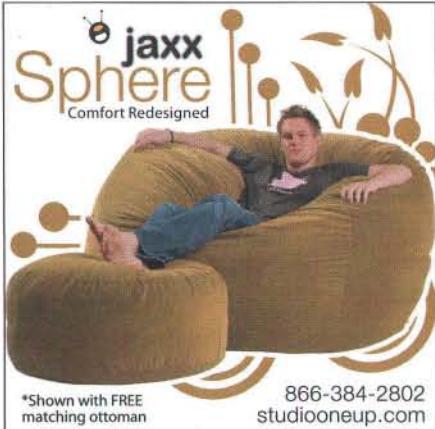
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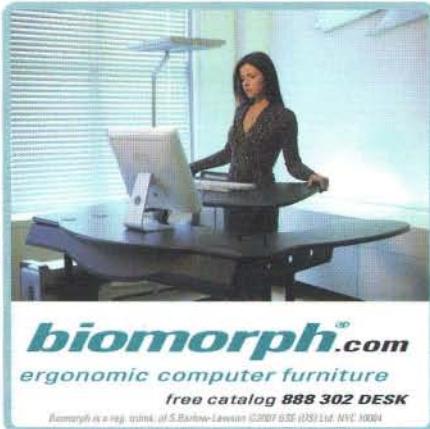


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## Free!

CONTINUED FROM PAGE 149

Milton Friedman himself reminded us time and time again that "there's no such thing as a free lunch."

But Friedman was wrong in two ways. First, a free lunch doesn't necessarily mean the food is being given away or that you'll pay for it later—it could just mean someone else is picking up the tab. Second, in the digital realm, as we've seen, the main feedstocks of the information economy—storage, processing power, and bandwidth—are getting cheaper by the day. Two of the main scarcity functions of traditional economics—the marginal costs of manufacturing and distribution—are rushing headlong to zip. It's as if the restaurant suddenly didn't have to pay any food or labor costs for that lunch.

Surely economics has something to say about that?

It does. The word is *externalities*, a concept that holds that money is not the only scarcity in the world. Chief among the others are your time and respect, two factors that we've always known about but have only recently been able to measure properly. The "attention economy" and "reputation economy" are too fuzzy to merit an academic department, but there's something real at the heart of both. Thanks to Google, we now have a handy way to convert from reputation (PageRank) to attention (traffic) to money (ads). Anything you can consistently convert to cash is a form of currency itself, and Google plays the role of central banker for these new economies.

There is, presumably, a limited supply of reputation and attention in the world at any point in time. These are the new scarcities—and the world of free exists mostly to acquire these valuable assets for the sake of a business model to be identified later. Free shifts the economy from a focus on only that which can be quantified in dollars and cents to a more realistic accounting of *all* the things we truly value today.

## FREE CHANGES EVERYTHING

Between digital economics and the wholesale embrace of King's Gillette's experiment in price shifting, we are entering an era when free will be seen as the norm, not an anomaly. How big a deal is that? Well, consider this analogy: In 1954, at the dawn of nuclear power, Lewis Strauss, head of the Atomic Energy Commission, promised that we were entering an age when electricity would be "too cheap to meter." Needless to say, that didn't happen, mostly because the risks of nuclear energy hugely increased its costs. But what if he'd been right? What if electricity had in fact become virtually free?

The answer is that everything electricity touched—which is to say just about everything—would have been transformed. Rather than balance electricity against other energy sources, we'd use electricity for as many things as we could—we'd waste it, in fact, because it would be too cheap to worry about.

All buildings would be electrically heated, never mind the thermal conversion rate. We'd all be driving electric cars (free electricity would be incentive enough to develop the efficient battery technology to store it). Massive desalination plants would turn seawater into all the freshwater anyone could want, irrigating vast inland swaths and turning deserts into fertile acres, many of them making biofuels as a cheaper store of energy than batteries. Relative to free electrons, fossil fuels would be seen as ludicrously expensive and dirty, and so carbon emissions would plummet. The phrase "global warming" would have never entered the language.

Today it's digital technologies, not electricity, that have become too cheap to meter. It took decades to shake off the assumption that computing was supposed to be rationed for the few, and we're only now starting to liberate bandwidth and storage from the same poverty of imagination. But a generation raised on the free Web is coming of age, and they will find entirely new ways to embrace waste, transforming the world in the process. Because free is what you want—and free, increasingly, is what you're going to get. ■

**CHRIS ANDERSON** ([canderson@wired.com](mailto:canderson@wired.com)) is the editor in chief of WIRED and author of The Long Tail. His next book, FREE, will be published in 2009 by Hyperion.

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